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“ON THE STATE OF LUNACY”

1859–1959*

By

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IN choosing a historical subject, the easiest thing to do is to look for centuries, and it so happens that the year 1859 was an eventful year in British psychiatry and is moreover a specially well-documented one, and further that the events and opinions thus documented seem to have a particularly topical interest for us today. In the first place, there was published in 1859 the book to which the title of this Address refers—*On the State of Lunacy*, by J. T. Arlidge, sometime Resident Physician to St. Luke's Hospital, a unique discussion of the problems of mental illness as they appeared to progressive specialists of the day. Secondly, an attempt to introduce fresh legislation led in February, 1859, to the appointment of a Select Committee of the House of Commons, which issued its report in the following year. Thirdly, the Annual Reports of the Commissioners in Lunacy for the years around 1859 are especially illuminating. In 1858 they sought to overcome the “dogged and passive resistance” of the parish authorities—of which more hereafter—by issuing a Supplement to their Report constituting a full and convincing indictment of the treatment of mental patients in workhouses and workhouse infirmaries; and their Report for 1859 contains an account of the London Licensed Houses. Again, it so happens that the Presidency of what is now the Royal Medico-Psychological Association, but then existed under a more humble name, was held in these years by four outstanding personalities—Forbes Winslow in 1857, followed by John Conolly, Sir Charles Hastings and Dr. (afterwards Sir John) Bucknill, all of whose inaugural Addresses reflect the ideals and practices, hopes and anxieties of their fellow-members. I should add here, but it would be beyond my sphere to refer to it any further, that following Dorothea Dix's visit to Scotland, and the institution of the Scottish Commissioners, the early Reports of that body give full descriptions of the state of affairs there, and of the rapid improvement brought about by Dr. W. A. F. Browne and his colleagues.

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This year 1859 conveys to each of us different associations. We may recall it as a year of battles, leading to the liberation of Italy; but Magenta and Solferino became names of colours as well as of battles, and stand for new and vast developments in chemical science and industry, while *The Origin of Species* stands for an even greater revolution in the biological sciences. We may think of 1859 as the year in which John Brown's soul began its immortal march, or as the time when a minor revolution in taste started with the building by Phillip Webb and William Morris of the Red House at Bexley. We may think of *Adam Bede* or of the *Tale of Two Cities*—though perhaps it would be more appropriate to bracket Dickens's more sociologically significant works *Bleak House* and *Little Dorrit* which immediately preceded and followed. Nor will your retiring President* have failed to recall that a famous work was germinating in the mind of an author well known to him—I refer to Wilkie Collins and *The Woman in White*—and this brings us very near to our subject of to-day.

We have all been reminded of how the horrors of the Italian battlefields led in due course to the foundation of the International Red Cross. And in this same year, Florence Nightingale, already a semi-invalid and recluse, wrote both her *Notes on Hospitals* and her *Notes on Nursing*, advised and decided on the removal of St. Thomas's Hospital and was engaged in the complicated negotiations involved in the founding of her Nurses' Training School. Independently, again in 1859, William Rathbone founded District Nursing in Liverpool—a work soon to be closely connected with the nurse-training movement. These were also the first years of the National Association for the Promotion of Social Science, at whose meetings several papers closely related to our subject were read. Moreover the Medical Act of 1858 had just come into force, and the General Medical Council had begun its task of rationalizing the old chaos of medical qualifications and raising the standard of medical education.

About this time the great London voluntary hospitals were flourishing: their system of nursing, though as yet unaffected by the new training-school movement, had greatly improved, and their medical staffs included men whose names are still household words. London was proud of them, and they are fully described in the voluminous topographical works of the period. Yet Knight's *Cyclopaedia of London* expresses surprise at the fact that the number of patients resorting to them was so much less than for the hospitals in the city of Paris. The reason became clear enough when articles in the *Lancet* began to reveal the existence among the sick and infirm, not of a submerged tenth, but of an immense submerged majority. "Our voluntary hospitals can but lightly touch the surface of the whole field of London misery; the eighteen in London provide 3,738 beds; but the metropolitan workhouses provide beds for 7,463 'sick' and nominally for about 7,000 'infirm', but in reality for a much larger number of the latter. The public, as ratepayers, are falsely pretending to supply proper medical treatment and nursing to a great number of persons whom in fact they neglect and mismanage; the whole business is a sham, a mere simulacrum of proper hospital accommodation." It was to the National Association for the Promotion of Social Science that Frances Cobbe and Louisa Twining communicated their ideas for some alleviation of this state of affairs, by means of their "Workhouse Visiting Society", founded in this same year 1859. In accordance with the social outlook of the day they felt it necessary to point out that pauperism might be due to calamity as well as incapacity, and disease

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due to virtue as well as vice. Not venturing to suggest that the sick and infirm paupers should receive more than bare necessities out of the rates, they asked only for permission to supplement these with comforts provided out of private charity. They pointed to the great number of incurables—cases of cancer, dropsy, consumption, paralysis—to whom they wished to bring good beds, easy chairs, prints, flowers, books and fruit, and even perhaps some paid nurses to replace the “monster evil”—the rude untrained paupers who were supposed to attend to their needs.

In those days, Thomas Wakley, the Editor of the *Lancet*, was a vigorous reforming force, and his journal gave some support to the movement, but it was not till after his death that in 1864 the *Lancet* took up the cause of workhouse reform in earnest. In 1865 it appointed a Commission to inspect and report on the London workhouse infirmaries and to compare them with the voluntary hospitals, and the published collection of reports gives a clear picture of conditions crying out for reform. Although by this time some Unions had built reasonably planned infirmaries, some of which are in good use as hospitals today, others made do with buildings which a glance at their shape and position on a map of London would at once condemn. Here at St. Martin-in-the-Fields, at St. Giles's, at Smithfield, Clerkenwell, Southwark, and elsewhere, cramped, crowded wards, ill-ventilated, with the most primitive sanitation, were furnished with beds which might be too short or too narrow or even partitioned into sections giving thereby barely two feet in width for each occupant. Here, although “sick extras” were allowed, the great majority lived on the paupers’ “house diet”. So-called “able bodied” but often old, decrepit and drunken pauper inmates acted as unpaid attendants, with here and there a few paid, but still untrained nurses as evidence of more progressive methods.

The reason for these conditions, for which the *Lancet* Commission attach no blame to either the Masters or Medical Officers of the Unions, derived from the confused theories underlying Poor-Law Administration, by which the principle of “less eligibility”, applicable if at all to able-bodied paupers, was extended indiscriminately to the aged and the sick. It is well known that it was the intention of Edwin Chadwick and Nassau Senior, the authors of the Poor Law of 1834, to arrange for the separate care of these and other classes, but whether from deliberate parsimony, or because of the long-drawn-out conflict between Chadwick and the Poor Law Commissioners, nothing had been done, except that in some cases the children had been removed to huge “District Schools”; apart from this, the all-purpose workhouse, supported by the separate Union rate, and therefore impoverished where the need was greatest, remained the rule.

Once roused and reinforced by powerful influences such as that of Florence Nightingale and of John Stuart Mill, public opinion brought a rapid reform, and in London Gathorne-Hardy's Metropolitan Poor Act of 1867 introduced a partial equalization of rates, separate infirmaries and a special organization, the Metropolitan Asylums Board, for certain common purposes. The *Lancet* commented that hitherto the sick pauper had not been regarded as a man and a brother, but in future our infirmaries would be a credit to our profession and to Christianity.

However, medical relief of the poor was not confined to the workhouses, for there existed also a system of home visiting by parish or district medical officers. Of this I shall say little, except that it was manned by underpaid and overburdened doctors, unsupported by any nursing or social services and working largely under the most primitive conditions. Both Thomas Wakley

and the recently formed British Medical Association campaigned for years on behalf of these unrecognized members of the profession, whose work only came into prominence during the numerous epidemics of the period.

So far you will notice that I have said nothing at all about mental illness or mental defect, and this, of course, was deliberate on my part, because I wanted to approach the subject of the "State of Lunacy" in and about 1859 from the somewhat unfamiliar angle of a comparison with the services available for other forms of illness and infirmity. Indeed the history of mental illness and its treatment in this country cannot be understood at all without constant reference to the Poor Law structure, and especially to the dichotomy between two sets of public authorities which bedevilled the problem throughout the 19th century.

When the Act, known as Wynn's Act, of 1808 created the first County Asylums, their management was entrusted to the County Administrative Body, namely the Justices of the Peace, and the county was chosen as the only area larger than the individual parish and able to support an institution of this kind. At that time, however, the Justices were much more closely connected with the Poor Law than they became later in the century, and it was as natural for them to issue their warrant for a pauper's admission to an asylum as it was to fix a rate, order out-relief, or hear an appeal against an Overseer's decision. But by the Act of 1834 the Justices lost all but a nominal connection with the new Boards of Guardians, while at the same time the new Unions provided an expanded area for the erection of large workhouses. It seems very likely that if the provision of public asylums had been delayed until after 1834, they might well have been placed under the control of the Poor-Law Unions. Had this happened the subsequent dichotomy would have been avoided, but on the other hand the standard of care in the asylums would have been kept at Poor-Law level and progress would have been greatly retarded.

As it was, the Justices succeeded in creating institutions which, whatever their shortcomings, were in some ways the envy of other countries. The French psychiatrist, Parchappe, who visited them in the 1850s spoke of "those edifices majestic in their general effect and comfortable in their details, those grandiose parks with luxuriant plantations and verdant flowery lawns, whose harmonious association gives English asylums an exceptional character of calm and powerful beauty".

That these asylums were intended to be places of treatment and cure is beyond doubt. In his evidence to the 1859 Select Committee, Lord Shaftesbury put it very clearly: "The great object that was proposed in 1845 was that all the recent cases should be sent to the central asylum as early as possible; and we calculated that if these cases were taken within a reasonable time they would be cured at the rate of from 50 to 80 per cent. and the patient returned to society." In these same early '40's the Hanwell Justices' Committee were proclaiming: "It ought to be known that Hanwell is just as much a hospital as St. George's or St. Bartholomew's and ought to be equally well staffed." And Arlidge in his 1859 book repeats that insanity is a very curable disorder if brought early under treatment, quoting figures of 62 per cent. at St. Luke's in London, the Derby County Asylum and elsewhere. True, in the same year, Maudsley, in his report from Cheadle Royal, had counselled "a discreet scepticism" as to "very high percentages of so-called recoveries"; but this does not alter the fact that recovery was what was being aimed at.

In 1856 Conolly published his book on *The Treatment of the Insane without Mechanical Restraints*, summing up his 18 years experience of a system which

by then had become the general practice. He commented on the "highly-accomplished medical men who are now competing for Asylum appointments"—"the duties", he said, "were formerly those of coercion, but now they are those of scientific treatment". Bucknill, reviewing the book, points out that the new system was large, arduous and intricate, not a simple and isolated improvement, but still the best system and one to be supported as much by foreseeing and overcoming its difficulties as by advocacy and contrast. Bucknill's liberal ideas were well shown when in 1857 he established a seaside branch to the Devon Asylum in an ordinary house at Exmouth; at first meetings of protest were held and petitions sent to the Home Secretary; but the petitioners were advised that their prayer was unreasonable and, there being no such thing as a local planning authority, the experiment was carried out. We are told that "the manner in which the apprehensions of the townspeople were allayed and their prejudices disabused by a short observation of insane life was most creditable to their judgment and humanity; indeed the rector of the parish, who had taken the chair at one of the protest meetings, eventually moved into a house next to the one occupied by the patients." Bucknill, a man of action, who in these same years was busy organizing the Devonshire Volunteers, thus expressed his therapeutic outlook in his Presidential Address in 1860:

"No one can understand the insane, or exercise guiding and health-giving moral influence upon them, who cannot and does not, so to say, throw his mind into theirs, and sympathize with their state so far as to make it, at least during brief periods, almost subjectively his own. The man of rigid self-possession to whom sympathy is but a weakness; the man of stolid indifference to whom sympathy is but a word, can neither merit nor gain the confidence of the insane, and can exercise but little moral influence over them. But the true mental physician transfers for the moment the mind of his patient into himself in order that, in return, he may give back some portion of his own healthful mode of thought to the sufferer."

Nevertheless there was much that was not well in the State of Lunacy. I have already reminded you that 1859 saw the publication of Florence Nightingale's *Notes on Hospitals* and it was in this work that she drew attention to the simple principle, constantly ignored, that the first essential of a hospital is that it shall not do the patients harm. Arlidge in his book was expressing a general alarm among asylum physicians at a tendency for their institutions, conceived as places of cure, to acquire such anti-therapeutic features. He devotes a lengthy chapter to a consideration of what he calls "Causes Operating within Asylums to diminish the Curability of Insanity and involving a multiplication of Chronic Lunatics"; here are some sub-headings: "Magisterial interference—excessive size of asylums—efficient treatment impossible—degeneration of management into routine—evils of absence of medical treatment for individual patients—medical staff insufficient—inadequate remuneration of doctors and attendants."

"Many asylums," he says, "have grown to such a magnitude that their general management is unwieldy, and their due medical and moral care and supervision an impossibility. They have grown into lunatic colonies of eight or nine hundred, or even of a thousand or more inhabitants, comfortably lodged and clothed, fed by a not illiberal commissariat, watched and waited on, disciplined and drilled to a well-ordered routine, gratified by entertainments, and employed where practicable, and, on the whole, considered as *paupers*, very well off; but in the character of *patients* labouring under a malady very

amenable to treatment, if not too long neglected, far from receiving due consideration and care. To treat insane people aright, they must be treated as individuals, and not *en masse*; they must be individually known, studied, and attended to both morally and medically. If recent insanity is to be treated, each case must be closely watched in all its psychical and physical manifestations, and its treatment be varied according to its changing conditions. Can a medical man, surrounded by several hundred insane patients, single-handed, fulfil his medical duties to them effectively, even had he no other duties to perform, and were relieved from the general direction of the asylum?"

Arlidge believed that the publicity given to methods of moral treatment had been harmful; that whereas Pinel and Conolly and his followers had in mind the intensive study of the patient in a small hospital, under a progressive medical chief, with a staff of attendants personally directed by and loyal to him, Hospital Committees were distorting or misusing this concept of moral treatment, wrongly imagining it as something other than and even opposed to medical treatment, and therefore capable of being reduced to a routine under lay control. Conolly himself, in his Presidential Address in 1858, said:

"The government of our County Asylums is highly defective, and more especially that of our large county asylums near the metropolis. The governing bodies discourage and repudiate the aid of their medical officers, and show a want of discrimination between the requirements of the insane and those of mere paupers or prisoners in gaols."

Confirming these views, the Lunacy Commissioners in their 1859 report had severe criticisms to make of both the Middlesex asylums at Hanwell and Colney Hatch. There were only two doctors at each hospital (both called "medical superintendents"!); there were few night nurses; both hospitals were being extended to an inordinate size (though they still had less than 1,300 patients each); the new wards at Colney Hatch were defective and the former cheerful outlook was now obstructed; at Hanwell the doctors were not even allowed to read the Commissioners' own reports.

Yet the unenlightened Committees responsible were the successors of those who had proclaimed that asylums were in every way analogous to the great London Teaching Hospitals. I am inclined to suspect that the change may possibly be connected with the infusion of a larger urban element into the Middlesex magistracy—an element of close-fisted tradesmen, whose attitude was not very different from that of the Poor-Law Guardians themselves.

Nevertheless, progressive opinion still held that early admission afforded the best hope of treatment. "It is perfectly impossible", said Lord Shaftesbury in his evidence to the Select Committee, "that there should be anything like a proper curative process going on except in a central county asylum." He would have preferred a reversion to the older principle of the small treatment asylum, supplemented by annexes of simpler construction for chronic patients; but it was not till over thirty years later that admission hospitals or "acute hospitals" became regular asylum features.

In 1859 there were approximately 17,500 patients classified as paupers in county asylums or under contract in licensed houses; but according to Arlidge's estimate—for the statistics were very imperfect and confused) these constituted only some 54 per cent. of all pauper patients. About 7,000 were in workhouses, and it was calculated that up to 8,000 patients were living "with friends or elsewhere". Thus there was a tripartite classification—one section cared for by the County Justices, and two who were or were supposed to be the responsibility of the Poor-law Guardians. I need hardly point out that this

corresponds very closely to the present or future grouping under hospital boards, in local authority residential homes and in community care respectively.

The dichotomy reflected the difference between the County and the Union administration, consequent on the Act of 1834, which I have already mentioned, and this divergence was in turn reflected in confused and inconsistent legislation. At this point I should emphasize that Lunacy legislation, in so far as it related to patients in public asylums, was concerned not so much with safeguarding the liberty of the subject—for this was not conceived to be in any danger in such cases—but with establishing procedures for the ascertainment, protection and treatment of the mentally ill. An Act of 1828 had laid down that the Justices were periodically to issue warrants to the parish overseers to prepare lists of all insane persons known to them, and these were to be laid before the Justices, so that they might make reasoned decisions for the patients' welfare. It is evident that the machinery for carrying this out was wholly inadequate. When the Lunacy Commissioners made their first survey and report in 1844, they complained that "in no instance had County Magistrates availed themselves of this information in order to establish a system for early admissions to asylums". In 1842, the Poor Law Commissioners had issued a directive to Boards of Guardians pointing out that "with lunatics the first object ought to be their cure by proper medical treatment. This can only be obtained in a well-regulated asylum; and therefore the detention of any curable lunatic in a workhouse is highly objectionable on the score both of humanity and of economy." But what remained more prominent in the minds of parsimonious guardians was the fatal Section 45 of the Poor Law Act, which prohibited the detention of *dangerous* persons of unsound mind in workhouses for more than 14 days, and this was taken to imply that the detention of any who were not dangerous was allowable. This interpretation, though declared to be of very doubtful legality, served as the pretext for retaining in the workhouses in the interests of cheapness a large mass of patients who by 1859 numbered, as I have already shown, about 7,000, more than half as many as in the asylums themselves. This practice continued to defeat every attempt to suppress or at least to diminish it, whether by remonstrances, directives and injunctions or by the more stringent legislative provisions of 1845 and 1853. The shadow of the workhouse hung over the sufferer from mental disorder almost as much as it did over the physically sick and infirm.

In their second report, issued in 1847, the Lunacy Commissioners described the workhouse position very fully. Taking a moderate and realistic view, they classified the patients they had found in the workhouses they had visited. They recognized three categories: the defectives from birth; the demented and fatuous; and the deranged or disordered; and they entered into a full description of each of these—no doubt the work of the medical Commissioners, Drs. Prichard and Gaskell; we have here in fact a lucid and accurate account of every main form of mental disorder, its problems and perplexities. I quote one passage describing a type which no doubt you will recognize as not unlike one of those defined in Section 4 of our new Mental Health Bill:

"We have met with persons who exhibited a degree of viciousness and perversity of temper and a total want of self-control which it is difficult to reconcile with the possession of common understanding. These have sometimes been denominated morally insane; but it is not always easy to say how they should be dealt with. The Master of the Workhouse, finding that all discipline and all ordinary motives when applied to them utterly fail of their natural

effect, is usually glad to get rid of them; but if they are certified and sent to the Asylum, they are soon discharged again as showing no symptoms of insanity; and being wholly unable when at large to conduct themselves like reasonable beings, they find their way to the House of Correction or the Gaol, unless they have had sufficient foresight to return to the shelter afforded by the Workhouse."

As to the congenital mental defectives, the Commissioners pointed out that "though persons of this description are seldom fit objects for a curative asylum, they are in general capable of being greatly improved, both intellectually and morally, by a judicious system of training and instruction; their dormant or imperfect faculties may be stimulated and developed; habits of decency, subordination and self-command may be inculcated and their whole character as social beings may be essentially ameliorated." They looked to philanthropy to further these aims, and in that same year, 1847, the Rev. Andrew Reed, with the support of Gaskell, Conolly and others, was able to found the first institution for defectives in the country. By 1858 this institution, now removed to Earlswood, was, after a rather shaky start, entering a more successful phase under its most famous superintendent, Langdon Down; while in February, 1859, a second institution, the Royal Eastern Counties', was opened at Colchester.

In their 1847 report the Commissioners, in spite of a good many criticisms, were on the whole hopeful of improvement, relying on the co-operation of the Poor Law Commissioners, to whom this part of their report was addressed. But in their succeeding annual reports there is evidence of increasing displeasure and alarm as they found their recommendations ignored, and conditions, if anything, worsening. In 1858 the Commissioners decided that the time had come for greater publicity with a view to stronger pressure for reform, and they prepared a supplement to their report, running to 80 pages, which was issued in April, 1859, concurrently with the sittings of the Select Committee.

The Commissioners found that some of the small county workhouses were not at all unsuitable as homes for some types of defectives; "the arrangements have a homely and domestic character, there are means of occupation and for exercise; the imbeciles are regularly employed, cheerful and comfortable." But these were exceptions. In most workhouses "the insane inmates are intermixed with the ordinary residents, so that it is next to impossible to offer suggestions for improved care". Again, elsewhere the Guardians had introduced separate lunatic wards, but to these also the Commissioners offered strong objection, for their creation gave the Guardians an added excuse for retaining all types of mental patients while making no effort to provide these patients with decent living conditions or adequate medical or nursing attention.

Thus, in contrast to the progressive ideas and practice of Bucknill at the Devon Asylum, we have the attitude of the Plymouth Borough authorities, who for many years were content to send most of their patients to Plympton House, one of the most notoriously bad licensed houses in the country, and to retain others in the workhouse. Here in 1854 the Commissioners found new wards being fitted up, including cells measuring no more than 6 feet 6 inches by 3 feet 3 inches with barred doors and little ventilation, no bedding, and mechanical restraint exercised by attendants. On this subject of nursing, the Commissioners' 1859 Report must be quoted in full:

"Under experienced and well-trained nurses, it is known that the bad habits of patients, dirty, mischievous, or otherwise objectionable, have been

removed; the irritability and tendency to violence have been suppressed or modified; and the intellect has been so far guided and improved as to render the patients capable of some useful occupation, and of enjoying some of the comforts of life. But the expense attendant on such desirable supervision has, in most places, prevented the Guardians from affording this benefit to their Insane Patients, who are therefore for the most part entrusted to inexperienced persons, resident in the workhouse, and who are themselves paupers. These persons have rarely any regular wages, however small; but in return for their labour are occasionally requited by some trifling gratuity, such as an allowance of beer or spirituous liquors, or an increase of diet. The persons selected on these principles as nurses are old and feeble people, having no particular qualities of intellect or temper recommending them to the office. Yet to such individuals, strait waistcoats, straps, shackles, and other means of restraining the person are not unfrequently entrusted; and they are, moreover, possessed of the power of thwarting and punishing at all times, for any acts of annoyance or irregular conduct, which, although arising from disease, are nevertheless often sufficient to provoke punishment from an impatient and irresponsible nurse."

"As evidence of the absence of all the important requisites in persons of this class, the following facts may be stated:

"In the Stepney Union, at Wapping,* the nurse is a pauper receiving no pay, but having extra food, and two pints of beer daily. The Matron said that she was kind towards the patients (30 in number); but her manner certainly did not indicate kindness. Inquiries being made as to the diet, she could not (although she asserted she 'knew all about it') tell the amount of food at any meal. After repeated mistakes in giving the names of the patients, she insisted that she went 'entirely by her list'. On the list being produced, it was found that she could not read." Further, there were no means of exercise or occupation: "Of all the miseries undergone by this afflicted class", says the report, "there is probably none which has a worse effect than the exclusion from all possibility of healthy movement. Nothing more powerfully operates to promote tranquillity than the habit of extensive exercise; and in its absence the patients often become excited, and commit acts of violence more or less grave, exposing them at once to restraint or seclusion, and not unfrequently to punishment. In not a few instances the outbreak has been looked upon as an offence or breach of discipline, and as the act of a responsible person; and the patient has been taken before a magistrate and committed to prison."

"Thus an insane patient was once sent from the East Grinstead workhouse to Lewes gaol for six months for threatening the Master. In the Epping workhouse a patient, undoubtedly of weak mind (although capable of being usefully employed) had been subject to paroxysms of excitement, during which he broke windows, destroyed his clothes, and committed other acts of insubordination for which he had been frequently imprisoned, and the medical officer was of opinion that although of unsound mind, he was not sufficiently irresponsible to exempt him from punishment. Yet this same medical officer declined to send him to an asylum (as recommended) because, according to his statement, he was not dangerous to himself or others."

I should emphasize again that these detestable conditions and practices were found not in remote asylums to which, we are so often wrongly told, mental patients were banished for "custodial care", but in the heart of London and the great cities. Thus in St. Martin's workhouse "a violent lunatic was entrusted

* See "Wapping Workhouse" in Dickens's *The Uncommercial Traveller*.

to the care of an old pauper 70 years of age, who was the keeper of Ward F. On being removed from some restraint which had been imposed on him, he picked up a poker and struck the feeble old pauper over the head till he died." This St. Martin's Workhouse stood in what was then Hemming's Row, now the foot of Charing Cross Road, at the back of the National Portrait Gallery.

Thinking that perhaps the Commissioners had overstated their case and that the Poor Law Board might have had some reply to their criticism, I looked up the volumes of Annual Reports of that Board in the L.S.E. Library, and to my surprise I found that though the reports dealt at length with such matters as the periodic rise and fall of pauperism, they had nothing whatever to say about the condition of either the sick or the insane in the Poor-Law institutions. As if to emphasize this telling silence, a copy of the 1858-9 Lunacy Commissioners' Report Supplement was dutifully bound in, in its proper order of date. Representatives of the Poor Law Board were, of course, summoned to give evidence before the Select Committee, and were able to point to some accidental exaggerations here and there in this document, but not to shake the general indictment. As a matter of fact, conditions were rarely better at the time of the *Lancet* Commission in 1865 and 1866. At Bethnal Green the insane ward was "a disgrace to the institution"; at Clerkenwell "the women's ward offered an instance of thoughtless cruelty which nothing could excuse the guardians for permitting". At St. Pancras the Guardians had established "insane wards" and were attempting to treat all pauper cases there rather than send them to the asylum—"but," says the *Lancet*, "this was nothing but a superficial and mischievous imitation of proper asylum treatment, and the guardians were showing short-sighted folly in attempting to charge their meagre establishments with this additional responsibility." Only at Camberwell was there a feature worthy of great praise—a detached, pleasant and well-furnished building, with plenty of indoor and outdoor amusements—arrangements which the report says are "as commendable as they are unusual".

Reform came to London, though not to the provinces, in 1867, but hardly on ideal lines, for under the policy of the new Metropolitan Asylums Board the workhouse insane were herded into the huge, cheaply built barrack-like and isolated asylums at Leavesden and Caterham, whose further development I cannot attempt to follow here.

As for the third category of patients, those living in the community, I have already shown that the legal provision made for them was far from being matched by the resources available. Many had been left with their friends or families, but the relief given them was trifling and medical visits infrequent and perfunctory. They were often subject to cruelty springing from ignorance. Hitchman, of the Derby County Asylum, remarked:

"Many individuals who perpetrate these enormities upon their kith and kin, and who may render them permanent cripples in body and idiots in mind, have done so without malice, without passion, with no conception of the present suffering or ultimate mischief they effect."

Much harm was done also by concealment of patients, through fear of the process of pauperization which accompanied admission, whether to the workhouse or the asylum. Where the law was taken literally, the patient had actually to be reduced to destitution before he could be admitted; elsewhere interpretation was less strict, but if the patient was found to have means, his goods could be seized in payment for his maintenance, and his whole family pauperized. Arlidge in his book argues powerfully for a change in the status of the County asylums, making them accessible to all, and Conolly, Gaskell and others urged

the creation of "middle class" asylums on the lines of the Chartered Asylums of Scotland.

In addition, especially in country districts, there were over 1,000 patients who had been placed by the Poor Law authorities as single patients in private houses. The Commissioners' Report points out that "the rates of payment are very small; that complete control of the patients is exercised by persons ignorant and possibly harsh; and that quarterly statements as to their condition are not forwarded."

Meanwhile the demand for care and treatment on a payment basis was being met in two ways. There was an expansion of the hospitals founded by voluntary subscription—otherwise the "Registered Hospitals"—some of which had originally been started as joint institutions with the County Asylums—Barnwood House and The Coppice at Nottingham for instance, celebrate their centenary next year. But to a much larger extent private patients were admitted to a multitude of Licensed Houses. Of these there were nearly 100 in existence in 1859, though the number was steadily falling since its peak in the 1830s. Some took several hundred pauper patients under contract and made this their main work, or rather source of income; it is in relation to these houses that the efforts of the Commissioners over a period of 30 years had been most successful. Others housed small numbers of well-to-do patients; their proprietors ranged from mere speculators to men of the highest professional standing; but good or bad, reputable or otherwise, none escaped criticism or calumny.

Hack Tuke's well-known *History of the Insane in the British Isles* tells us that in 1858 there occurred "one of those waves of suspicion and excitement which occasionally pass over the public mind. Sensational articles appeared in the papers, and novels were written to hold up those connected with the care of the insane to public obloquy. The author himself did not escape animadversion, and was represented in a newspaper as a brutal mad doctor using a whip upon an unfortunate patient 'in an institution of which better things might have been expected'". The author was at that time a visiting physician to The Retreat. He says that the bewildered Editor had confused person and place in an incredible manner—it may be that the confusion was with the Tuke of Chiswick Manor House, who, however, was certainly equally incapable of such conduct. Be that as it may, there was a demand for new legislation. Forbes Winslow, in a valedictory address to the Medico-Psychological Association in 1858, discusses some of the possible reforms; naturally rejecting proposals by the Lunacy Law Amendment Society for a full dress trial by jury before certification of a private patient, he suggested that the certificates should be seen and countersigned by independent experienced doctors invested for the purpose with quasi-judicial functions. He also advocated the admission of incipient cases as voluntary patients, and of mild and temporary cases without certification, the consent of the Commissioners being a sufficient safeguard; and lastly he urged the setting up of some short, summary, inexpensive mode of procedure for the protection of patients' affairs, as distinct from the cumbersome and expensive Lunacy Inquisition.

Early in 1859 the Government introduced a Bill, entitled the Lunatic Treatment Bill, to deal with these matters. It provided among other things that there should be local medical examiners, independent of the Commissioners, who should visit, examine and report on all patients admitted to Licensed Houses, within seven days of their admission. This was strongly opposed by the Medico-Psychological Association, who, at an emergency meeting on 26 March resolved that the clause was highly objectionable, inasmuch as the examiners would in

most cases be gentlemen imperfectly acquainted with insanity and their visits would cause much disturbance to the patients.

The Association also objected to another clause prohibiting any doctor connected with any licensed house from certifying a patient for admission to another licensed house—a provision which as things were at that time would have excluded virtually every available specialist in the country. The Association further supported the demand for facilities for voluntary admission. All this was set out more fully in Sir Charles Hastings's Presidential Address later in the year.

Meanwhile, on 15 February a Select Committee of the House of Commons had been appointed "to inquire into the operation of the Acts of Parliament and Regulations for the Care and Treatment of Lunatics, and their property". And on 21 February it was ordered that the Bill be referred to the Committee. This way of doing things is unfamiliar to us in these days; in fact the Committee proceeded very much on the lines of a Royal Commission or Departmental Committee, summoning and questioning witnesses, and receiving memoranda; the witnesses were, however, asked among other things to comment on the provisions of an already-drafted Bill. Moreover, the Home Secretary, Sidney Walpole, who had presented the Bill, was Chairman of the Committee; on the other hand, when Lord Derby's Government fell later in the year and he was succeeded by Lord Palmerston, the Committee was reappointed, the new Home Secretary was not a member and Walpole continued to preside.

Thus in March, 1859 the Select Committee was in session, hearing evidence which as published fills a bulky volume—incidentally a joy to read and refer to, thanks to good type and skilful indexing. To my great regret I cannot report that the evidence given on our actual centenary date, 21 March, was at all outstanding—it is in fact the necessarily rather dull contribution of the Chancery Visitors and Registrars. But the three previous sessions, 10, 14 and 17 March were taken up with the monumental and masterly evidence of Lord Shaftesbury, as Chairman of the Lunacy Commissioners; and on 24 March evidence was given by Samuel Gaskell, Medical Commissioner, and by the Metropolitan Inspector of the Poor, that Mr. Farnall who appears so prominently in the relevant chapter of Mrs. Woodham-Smith's *Life of Florence Nightingale*.

Time will, of course, not allow of even a summary of the evidence, which covered all the aspects of the State of Lunacy which I have already attempted to depict from other sources. I cannot refrain, however, from quoting for its topicality from the evidence given by Mr. J. T. Percival, the Secretary of the Alleged Lunatics' Friends' Society. As seems to have been the case with Secretaries of similar societies in subsequent years, his declared motive in taking up this work was somewhat unexpected; "it appears to me," he said, "that no Christian nation should allow any preacher or teacher to be confined as insane when it is recollected that the Founder of our faith and his Apostles were accused of being madmen."

As usual, also, he advocated a complicated judicial procedure before a patient could be detained. What I want to recall particularly, however, is the lengthy discussion between him and the Committee on the subject of the patients' correspondence; for although he wished the patient to be granted an unfettered right of correspondence, he conceded that letters should be withheld if there was some remonstrance from the recipients, and he also allowed that "where the patient wrote in a loose and immoral manner", it might be proper to "exercise a previous caution".

The Committee reported in July, 1860; after a brief general survey of the

problems, they lay down as a first principle that "since a large proportion of cases are capable of cure if taken in time and carefully treated, it is certainly a matter of primary importance that our legislative provisions should be so framed as to promote the accomplishment of this desirable object". They commend the public asylums as "so well looked after and so carefully attended to that as regards them little alteration is required in the law"; though they agree in a tepid way with some of the criticisms expressed in Arlidge's book. They agree also that the chief evil for which a remedy is required is the detention of large numbers of patients in workhouses, but the remedies they propose for this cannot be said to be more than half-hearted.

The Committee, like all previous and subsequent Committees or Commissions, next attempt to tackle the problem of what they call "the circumstances in which the patient"—that is, the private patient—"may be placed under restraint, and the safeguards provided for the propriety of his confinement"—and, like successive Committees and Commissions in later years, they begin by declaring their conviction that unwarranted confinement is extremely rare. They firmly reject all proposals for a public enquiry or trial before compulsory admission. "It is unnecessary to dwell", they say, "on the various mischiefs which would result—the agitation to the patient's mind, the injurious comments which might be made, the unnecessary exposure of private matters, the stigma which might attach to him in the event of recovery, and so forth." They do, however, favour the idea that the authority for detention should be for three months only in the first instance, and that the certificates should be verified before a magistrate so far only as to enable him to determine whether the Act has been complied with; and they make other suggestions for a tightening up of the procedure, for maintaining communication between the patient and his friends while in hospital and for his more speedy discharge on recovery, and also for the better supervision of patients in single care.

No more was heard of the Bills with which the Committee was supposed to deal; no doubt they were lost anyway because of the change of Government. In 1862 a fresh Lunacy Amendment Act was passed. For private patients it gave effect to the tightening-up proposals of the Committee, but not to those recommending the three months' limit or verification before a magistrate.

The Act's attempt to remedy the workhouse evil consisted in a clause prohibiting the detention of any lunatic or alleged lunatic in a workhouse for more than 14 days unless it was certified by the medical officer that the case was one that could properly be kept there. It does not appear that this was very effective, as the number of patients in workhouses continued to rise. In 1874 the Government decided that incentive would have to be added to injunction, and offered the Guardians a 4s. a week grant towards the maintenance of every patient they sent to a public asylum, and in 1890* they imposed a magistrate's order for workhouse detention beyond 14 days. It was from these purely negative provisions, designed to save patients from prolonged workhouse detention, that there arose the more positive practice of admitting patients for 14 days' observation, and hence the system of mental observation wards, developing as they are today into short-term psychiatric treatment units.

At the same time the 1862 Act gave effect, in a very limited way, to the general desire for the legalization of voluntary admission. It enacted that any person who had during the previous five years been detained in any type of mental hospital, might enter a Licensed House as a voluntary boarder, provided

* More correctly, 1889. This and other reforms were effected by the Lunacy Acts Amendment Act 1889; the whole of the Lunacy legislation was then consolidated by the Act of 1890.

that he had himself written for the permission of two of the Commissioners. This was shortly afterwards extended to the Registered Hospitals also. From this small beginning sprang the eventual revolution which made voluntary, and now informal, admission the rule and compulsory procedures the exception. The 1862 Act therefore has in retrospect an importance which was not foreseen at the time, and deserves to rank among the landmarks of Mental Health Legislation.

I have said much about 1859 and little enough, except by implication, about 1959. I propose to leave it at that, for the analogy and the relevance of the "State of Lunacy" a hundred years ago must be evident to all. If the survey I have attempted were to be regarded in the light of a thesis, I would submit the following conclusions:

1. That the problems, aims and ideals of our predecessors in the field of mental treatment were not essentially different from those of today.
2. That the discomforts and sufferings to which the mentally ill were subjected were due, not so much to prejudice against mental disorder as such, as to a harsh and mean attitude towards public welfare services generally, as shown especially in the working of the Poor Law, and that these discomforts were fully shared by the physically sick and infirm and by the indigent through misfortune. The "differential" which today inflicts a lower standard of care on the mentally ill did not exist in those days.

Aubrey Lewis in his Maudsley Lecture has said that only an arrogant and ill-informed psychiatrist in our day would look down on the men who contributed to the advance of our subject in the mid-Victorian period, and this applies equally to those who gave their support as philanthropists or social reformers. Elsewhere he has warned us against complacency and condescension in these matters. Two French authors, *Sérieux* and *Libert*, who made a careful study of the treatment of the insane in 18th century France, expressed themselves similarly. "It would seem", they say, "that everything connected with mental illness and its treatment, whether under the old régime or at the present time, inevitably comes to be seen through the mists of legend and prejudice. It would be inexcusable if we who deplore with good reason the public's preconceived ideas about our work were to be just as blind when passing judgment on the practice of past centuries." And they quote with approval *Renan's* dictum: "It is a grievous error to believe that one can serve one's country or one's cause by maligning those who laid its foundations. The centuries of history are but leaves of a single book. True men of progress are those who take as their starting-point a deep"—and I would add an affectionate—"respect for the past."

NATIONAL STATISTICS IN THE EPIDEMIOLOGY OF MENTAL ILLNESS

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FOR a long time epidemiology was a term associated with the study of outbreaks of disease which were sudden and large-scale. The attempt to find common causative agents to which the majority of cases could be attributed has provoked a literature worthy to rank with some of the best detective fiction. So many of the guilty agents have now been either liquidated or rendered impotent that infectious illnesses have ceased to occupy the centre of the public health stage, and have yielded place, as objects of concern, to such chronic diseases as cancer, rheumatism, heart disease and the schizophrenias. These diseases do not generally show explosive outbreaks, although mental disorders have been known to behave in this way, as witness the outbreaks of Dancing Mania which originated in Italy in the thirteenth century. All this has led to a more exact concept of epidemiology as "the study of the distribution of a disease or condition in a population and of the factors that influence this distribution" (Lilienfeld (1)).

What part have national statistics to play in finding out the distribution of mental disease in a population? We must first ask whether, in fact, we are ever likely to find out the distribution of mental illness. Our earliest national statistics dealt with causes of death. Death, however, is a definite and detectable state. With illness we are not on such firm ground. If we define illness as a departure from the normal, we must then define the latter. But while it is relatively easy to establish physical or physiological norms, or at least limits within which the norm lies, behavioural normality is a concept which can vary from person to person, place to place and year to year. Nor, in the case of mental illness, can we say that a man is as ill as he feels, since he may not think he is ill at all, but rather that his family is behaving oddly and needs the doctor. And indeed we know that the first case to present may not necessarily be the most severe case of mental illness in the household. Again, in mental illness, we cannot claim the help of the post-mortem. It may give us a better idea of the epidemiology of cancer of the lung, but it does not reveal the disordered thought processes of the deceased. Another of our difficulties is the person who has learned to live with his symptoms—is he to be counted as well or ill?

Clearly we cannot depend either on the individual or on his fellows for data from which to determine the epidemiology of mental illness, and continuous surveys of large numbers of individuals would be impracticable. Some objective criterion of measurement is required, and one way to obtain it is by considering the effect of a person's actions on those around him. No man is an island, and in the ordinary way society gets along by a system of give and take. When, however, a person's mental state is such that this equilibrium between himself and his environment, in the widest sense of the word,

is disrupted, we have something which can be measured. It is with these measurements that national statistics are concerned.

"Disease is interpreted as a maladjustment between a host and the existing environment. The study of mass disease of human populations thus entails the necessity to deal with the community as a unit, a complete whole, all things living and non-living within a prescribed universe, if the particular concern of man himself is to be adequately understood" (Gordon *et al.* (2)). When a causative agent, such as alcohol or *Treponema pallidum* can be isolated, this will be recognized as a separate element, so that we shall then have three items to consider—the host, who has the illness, the causative agent, and the complex of factors which make up the environment. The absence or deficiency of an agent may also be causative, as in the pellagrous psychoses. Where no particular agent can be indicated, we shall probably find "an association of events or factors in such combination and at such time, that disease results . . . it is probable that many mental illnesses are in this category" (Gordon *et al.* (2)). Each of these three factors, host, agent and environment, must be studied, but the results which we see are due to the resultant force of these factors. So far as the host is concerned, we are interested in such things as the sex, age, race, physical and psychical condition, heredity and acquired susceptibility of the man who is mentally sick. Sex, age, intelligence quotients are data which can be collected nationally. Where an agent is involved, as in drug psychoses, for example, it cannot be assumed that this is the sole causative agent or even the most important. Under the heading environment must be placed all external conditions affecting life and development; these factors can be grouped into three categories, physical, biological and social. In the physical category we shall include factors of time and place, involving comparisons of disease in large and small cities, in different climates. Biological factors, involving the action of living things other than man himself, have a somewhat limited application in mental disease. The social component of the environment, which deals with all a man's associations with his fellow men, involves those values, beliefs and attitudes which characterize the behaviour of groups, whether these are territorial, like cities, the "new towns" or neighbourhoods; organizational, such as political or religious groups, or face-to-face, such as families and groups of friends. Other environmental factors which need to be considered are population density, overcrowding, migration, occupation, general activities, cultural values, and the impact of technical developments such as the aeroplane, television and atom bomb. A number of these data are also suitable for collection on the national scale.

GENERAL MEASURES OF MENTAL ILL HEALTH

While there are certain factors which affect the individual, and cause individual breakdowns, there are others which set a general climate of mental health or sickness in a population. Such are illegitimacy rates, divorce rates, proportions of children appearing in juvenile courts or resorting to child guidance clinics, prosecutions for drunkenness or sexual crimes, and suicides. All these conditions, if present to a considerable extent, militate against the normal growth and development of family life. We have various sources of national statistics which enable us to assess the general mental climate, to measure its variations and to compare it with that of other countries.

In England and Wales in 1957, about 34,500 children were illegitimate at birth, out of about 723,000 born alive; in other words, 4·8 per cent. of the

children born were not born into a normal family environment. Some extra-maritally conceived children are legitimate at birth, because their parents have married by then. Altogether there were 89,000 maternities conceived extra-maritally, in 1956, 12·6 per cent of all maternities (Registrar General (3)).

In 1957, again, the number of new out-patients attending child guidance clinics was 14,524 (Ministry of Health (4)). The age-limits for these children are not defined, but this number represents about 4 per 1,000 of those aged under 15.

Then there are the suicides, about 5,300 in 1957 or roughly 1 in every 100 deaths (Registrar General (5)). Another 5,400 people were known by the police to have attempted to commit suicide in the same year. The suicide rate per 100,000 population was 11·3 in England and Wales in 1955, higher than in Northern Ireland, 3·3, Canada, 7·0, the United States, 10·2, but not as high as in France, 15·9, Sweden, 17·8 or Switzerland, 21·6. Northern Ireland and Canada had low divorce rates, also, 0·10 and 0·38 respectively per 1,000 population, whereas the England and Wales rate was 0·60, Switzerland 0·89, Sweden 1·21 and the United States 2·29 (United Nations (6)).

Some indication of the extent of resort to alcohol is given by the fact that in 1957 64,500 people were found guilty of drunkenness in England and Wales; this does not include people found drunk in charge of a car. The number represents 1 conviction of every 540 people aged 15 and over. Among indictable offences known to the police in this year, too, were 6,327 offences between males, 11,588 offences against women and girls under 13 or under 16, and 312 offences of incest (Home Office (7)).

HOSPITAL STATISTICS AS A MEASURE OF MENTAL ILLNESS

When we come down to the level of the individual we have to confess that we do not know how many people are mentally ill, but only those whose mental illness comes to light, as when they consult their doctors, or are removed voluntarily or compulsorily to mental hospitals. For such people we have three sets of national statistics, those prepared by the Ministry of Pensions and National Insurance, based on medical certificates of incapacity, those from the records of a sample of 100 general practices and those for patients in Mental and Mental Deficiency Hospitals. None of these three gives a complete coverage, and to some extent they overlap. Probably the data obtained from the General Practitioner enquiry (Logan and Cushion (8)) of practitioner-treated illness without hospital referral and the hospital data together give the best picture we have so far been able to obtain. Sceptics will always decry the value of information about hospitalized patients, nevertheless when the eminent French psychiatrist Esquirol, in his *Des Maladies Mentales* (1838) published a description of the institutions for mental treatment existing in France at the time, he produced statistical tabulations which have since served as models for the mental hospital reports of the European and American countries. The type of data that were obtained in the Survey of Sickness in England and Wales during 1943-51 (Logan and Brooke (9)) and which are now being obtained by the United States Health Survey, and the data got from the General Practitioner Enquiry are recent supplementary sources of information. Until more inclusive measures of community mental illness than hospital admission rates can be devised, and in countries where such supplementary information does not exist, statistics of hospitalized patients will continue to be the basis of epidemiological studies.

One of the great hindrances to the utility of national statistical systems in this field has been the intrusion of the legal aspect. In this country, for example, a mentally sick patient has not just been admitted to hospital—he has been admitted either under an Act of Parliament or outside the provisions of an Act. As a result the tendency has been to think, not of the individual, but of the action of admission or discharge, or, on the other side of the Atlantic, of committal or separation. The patient is no longer Mr. Brown with his depressive psychosis; he is a first admission, or a Section 20 case; when he quits the hospital he will be a departure if he was a voluntary patient, but a discharge if he was a certified patient. These legal definitions have obscured the epidemiological significance of hospital statistics, because they have not told us who is ill, but how many times the swing door at the hospital entrance has opened for someone to pass through. This difficulty is one which can be overcome, and is in process of being overcome here, as we shall see later. It is inherent in the fact that national statistics are so often collected for lay administrators, whose concern is with providing beds for bodies rather than with the aspects of mental illness as such.

A number of countries now have fairly detailed mental hospital statistics. Of the English-speaking countries, Canada and the United States were in the field before us, with an impressive series, but since 1949 we have been trying to catch up. In that year a system was started of recording data of patients coming into or going out of mental hospitals. The record cards are sent each month to the General Register Office, where the information on them is coded, transferred to punched cards, and tabulated. For the first five years we were concerned only with events of entering and leaving hospital. In the first year or two we made no attempt to distinguish who was admitted for the first time from who was readmitted, and as a result we came in for some sharp criticism. However, it must be remembered that the hospitals which became vested in the Minister were very uneven in their standards of record-keeping, and to launch a national statistical scheme requires a great deal of hard work both with and by the hospitals, before we reach a state when the records are sufficiently reliable for conclusions to be drawn from them.

When considering the distribution of illness in a population, we think chiefly of incidence and prevalence. It is a sign of people's dependence on mental hospital statistics that in the literature first admission rates are commonly used as a measure of the incidence of mental illness, and the proportion hospitalized at a given time as a measure of its prevalence. If by incidence we mean the rate at which new cases of illness arise in the population, then first admission rates do not measure it; nor is the proportion of people in hospital at a given time a measure of the extent to which people are mentally ill. Most countries have a shortage of beds for the mentally sick and it has often been claimed that if the supply of beds were equal to the demand, then first admission rates would give a true measure of incidence. But now the whole trend is away from treatment in specialist hospitals, or in hospitals at all. This does not mean that hospital admission rates, whether first or subsequent, are useless measures, but that they will need to be extended to mental illness wherever it is treated before they give anything approximating to an idea of incidence. The same argument applies to prevalence.

A first admission to mental hospital may or may not be due to a first episode of mental illness in a patient; it may or may not be the first time he is treated. In these respects the patients first admitted in any year do not form a homogeneous group. First admission is a term which, in any statistical system,

must be defined. In our statistics we have been limited by the administrative organization of the hospitals; we have applied the term to statutory patients entering designated hospitals for the first time. Naval and military hospitals, long-stay annexes, mental rehabilitation centres, the State Institution at Broadmoor are examples of types of hospital not covered by our definition. In Canada, where the organization is freer, first admission applies to a patient admitted for the first time to any hospital for mental diseases or to the psychiatric unit of a hospital. There is, however, one great advantage in first admissions, and that is that they represent a number of different individuals, whereas re-admissions may include the same person coming back several times. It is reasonable to claim, that although hospital admission and residence rates do not give a true picture of incidence and prevalence, they give a not inadequate idea of the incidence and prevalence of serious mental illness.

HOSPITAL ADMISSION AND RESIDENCE RATES

Coming back to the concept of illness concerned with a host, an agent and the environment, national statistics have given us some ideas helpful in epidemiology. First—who is ill? In 1956 more than 47,000 persons entered designated mental hospitals in England and Wales for the first time; this represents about 9 out of every 10,000 males and 12 out of every 10,000 females. In addition, there were about 36,500 admissions of people who had been in before; some of which may be multiple admissions of the same person; they represent roughly 7 for every 10,000 males and 10 per 10,000 females.

First and other admission rates vary according to the patients' ages, usually following the pattern shown in Table I.

TABLE I
*Mental Hospital Admission Rates per 100,000 Home Population
England and Wales, 1956*

Age Groups				First Admissions		Other Admissions	
				Males	Females	Males	Females
0—	..	..	..	1	0	0	0
10—	..	..	..	6	6	2	1
15—	..	..	..	49	51	17	21
20—	..	..	..	93	92	59	53
25—	..	..	..	113	141	105	107
35—	..	..	..	110	139	102	136
45—	..	..	..	111	145	89	151
55—	..	..	..	144	164	104	170
65—	..	..	..	174	203	103	154
75 and over	..	..	..	275	301	63	77
All ages	..	..	..	92	119	67	96

The female rates exceeded the male rates at ages 25 and over; there was little difference between them in the younger age groups. First admission rates were high among old people, but other admission rates low, due to deaths in hospital while on first admission or after discharge and possibly due also to elderly people staying on in hospital because they had nowhere else to go.

First admission rates have been increasing, for both males and females in the last few years. The admission rates give an indication of the comparative probability of admission to hospital at different ages. They can be calculated on the national scale, because we know the age distribution of the population.

They cannot be calculated for admissions to individual hospitals, because in general the sex-age distribution of the population of catchment areas is not known, and also it is by no means sure that patients go from a catchment area to one particular hospital. To know the numbers in each age group is useful, because individual workers can then see how far any particular group of patients is a representative sample of the national total.

The proportion of the population which is in hospital at a given time also varies with age. Thus in 1956 the rates per 100,000 home population for patients on the books of mental hospitals on 31 December varied for males from 14 at ages 10 to 19 to 749 at ages 75 and over, and for females from 13 to 1,227.

Other details about the sick person cannot so easily be incorporated in national statistics. Race is an example of this. It might be defined here as the complex of hereditary characteristics which distinguish a group of people, and which are unchangeable. Nationality, cultural milieu, religion can be changed, but not race. Data about this are not easy to collect on a national scale; precise definitions are difficult to give and there is the complication of mixed parentage. Some countries distinguish between whites and non-whites. Others, where there is a large immigrant population, as in Canada, distinguish country of origin. We have made no attempt to ask questions about race, colour or national origin, feeling that even if we could assess the numbers of patients of different races entering hospital, it would be very difficult, in interpreting the figures, to separate the effects of race from those of a foreign environment. Physical and psychical condition, heredity and acquired susceptibility are other things which national statistics must avoid, because it is impossible to provide precise categories to which patients can be readily assigned on a large scale and with uniformity over the country. In the first year of our enquiry, we asked a number of questions with a genetic bearing, such as whether the patient was one of twins or triplets, whether his parents were related by blood, whether the patient married a blood relation, what was the mental state of the patient's first spouse, the age of his mother at the patient's birth, his age at first marriage and the duration of his marriage. These questions yielded a large proportion of "not known" answers, and were a warning against the occupational disease known as "statistician's greed".

THE IMPORTANCE OF DISEASE CLASSIFICATION IN EPIDEMIOLOGY

If the epidemiological approach is to make any worthwhile contribution towards solving problems of aetiology, it is necessary to have a classification of mental diseases. We know that there are various schools of thought about whether in fact there are mental diseases at all, or only people who are mentally sick. However, it seems unlikely that 3,000 psychiatrists would attend an international meeting on schizophrenia if they did not think such a clinical entity existed. Lemkau (10) rejects the theory that psychiatric illnesses should all be treated as reactions of varying severity scattered along some imaginary scale, and suggests that "the differences in distribution of the neuroses, schizophrenia, manic-depressive psychosis and alcoholic psychoses are so marked that they leave no doubt as to the specificity of these broad types of reaction or illness". In our national statistics we have already found that for schizophrenia and manic-depressive reaction as so diagnosed, not only the first admission patterns are distinctive, pointing to a different incidence, but also the patterns of discharge and retention, when the patients are followed up as individuals over a period of time.

TABLE II

First Admission Rates for Schizophrenia and Manic-depressive Reaction per 100,000 Home Population, 1956

			Sex	15—	20—	25—	35—	45—	55—	65—	75 and Over	All Ages
Schizophrenia ..	..	M		20	42	41	22	10	5	2	1	15
		F		17	29	35	24	17	11	7	3	15
Manic-depressive reaction ..	..	M		4	13	21	31	42	60	45	19	24
		F		7	17	38	51	58	73	58	21	36

Peak admission rates occurred for schizophrenics at ages 20–34, and in the older age groups, 45–74, for manic-depressive reaction. There may be real differences in the age-specific admission rates for these two diagnostic groups, but the fact that such differences are known to exist may influence the diagnosis.

Any classification we may have of mental disorders must be such that it can be applied uniformly by coders—regionally, nationally and internationally. Differences in admission rates between two diseases may be due to differences of incidence or to the fact that psychiatrists are using different diagnostic terms. For example, in England and Wales the admission rates for schizophrenia are lower than in the U.S.A. and Canada and those for manic-depressive reaction are higher. Does this really mean we are less schizophrenic than our transatlantic friends?

So far no universally acceptable classification of mental disease has been found. Section V of the International Statistical Classification of Diseases (11) issued by the World Health Organization in 1948 is devoted to psychiatry. While member states are all using this classification for their mortality statistics, Section V was not even tried in its entirety in any country but this one; Canada uses a modified form based on 21 categories in place of 26. I recently had an opportunity to discuss our difficulties with Professor Stengel, who has been making a study of the whole question on behalf of W.H.O., and in his opinion our troubles are not entirely due to the structure of the classification. Partly they are due to the way diagnosis is recorded on the record cards. We ask first for “mental, psychoneurotic or personality disorder causing admission to hospital”. Perhaps a collection of some of the diagnostic terms used would help to enrich a nomenclature, which, of its nature, can be expanded to cover any number of new terms. But while a nomenclature can expand, a classification is fixed; once it has been decided how many categories to have, every diagnosis which turns up has got to be assigned to one or other of these categories. Although Section V provides 26 categories, in 1956 43 per cent. of the first admissions were in two categories, schizophrenia and manic-depressive reaction. Considering all we read in the journals about the numbers of people who consult their general practitioners with psychosomatic symptoms, it seems extraordinary that only 46 should have found their way into mental hospitals as first admissions in 1956; but that is what the diagnosis on admission shows.

I feel that national statistics could be made much more meaningful if the psychiatrists would think of the coders' problems of classification when they are recording the diagnosis. Maybe there is some alternative wording for

such diagnoses as the following, which would make classification easier without sacrificing the truth:

Anxiety depression—in oriental (? disorientated).

Depression in pre-senile melancholia.

Reactive anxiety in chronic paranoid personality.

Neurotic deficiency.

Schizophrenic inadequacy.

Neurotic schizophrenia.

Psychotic hypochondriasis.

Affective disorder with depression and agitation where there is an added mixture of reactive endogenous elements.

ENVIRONMENTAL DIFFERENCES IN HOSPITAL ADMISSION RATES

How far can national statistics discern the factors affecting the distribution of mental illness? I would not care to contend that any one factor could be isolated by these means. Statistics do not unearth the buried treasure; they do, however, show you where to start digging, and this is surely a significant contribution.

If we consider the question of environment, the national statistics show up some interesting differences in admission rates according to the degree of urbanization of the patient's residence. For example, in 1953 for schizophrenia, people living in Greater London and the county boroughs had the highest rates, and those living in rural districts the lowest. In rural areas there was little difference between male and female rates in the younger age groups. Male admission rates showed far wider variations between areas than did the female rates. The admission rates for manic-depressive reaction were very similar in Greater London, the county boroughs and the urban districts; female rates exceeded those for males in all three. The highest female rates occurred in the urban districts, that is, in the small towns. The admission rates were lowest for people living in rural districts, and lower for females than males. The admission curves differ for the two diagnoses, but for each diagnosis they are similar as between districts.

A number of theories can be advanced to account for these differences, such as: unstable people drift into the towns; the stress of town life causes more frequent breakdown; people are more tolerant of mental disease in country districts and so less of the sick are hospitalized; mental hospitals are mostly situated in urban areas, so town dwellers will go into them, but the farther a person lives from hospital the less likely he is to go there; social isolation causes breakdown and this is more frequently found in big cities, etc. All these and other explanations need testing on a small and intensive scale, but this is the field of the research worker.

Differential admission rates between social classes have aroused much interest and speculation, both here and elsewhere. The general finding is that there is an upward gradient in admission rates as we descend the Social Class scale. In England and Wales social class is based on a classification of occupations, made, and now brought up to date every 10 years, by the Registrar General. The assignment of an occupation to a particular social class is undoubtedly influenced by other factors which are closely associated with it; most occupations involve some correlated standards of education, type of residence, monetary reward, etc. In our statistics, patients are classified by Social Class on admission; resident patients are not so classified, because the

longer they are in, the less significant does their occupational label become, and after 5 years or so their occupation might be better described as “mental hospital patient”.

The excess admission rates for men in the lower social classes, found in a number of studies made in the United States, are also found here on a national scale. Moreover, since national statistics go on from year to year, and this excess shows up constantly, we know we have a real fact and not a temporary phenomenon. Table III shows that taking all diagnoses together, in 1956, for men aged 20 and over, the first admission rate in Class V was nearly double that in Class I and more than double that in Class II. For admissions other than first, the rate in Class V was about 2·7 times that in Class I and about 3·4 times that in Class II.

TABLE III
*Admission Rates by Social Class per 100,000 Males Aged 20 and Over, 1956
(The Rates are Based on the Estimated Home Population, Distributed According to
the Social Class Proportions at the 1951 Census)*

Diagnosis			Admission		Social Class				
					I	II	III	IV	V
All diagnoses	..	..	First		103	89	106	105	205
			Other		71	57	71	80	193
Schizophrenia	..	..	First		11	8	16	17	45
			Other		10	11	23	25	70
Manic-depressive reaction			First		32	26	31	29	52
			Other		28	22	23	27	52

The gradient was even more pronounced for schizophrenia, the ratio of Class V to Class I rates being 4·2 for first admissions and 6·7 for other admissions. The gradient is particularly marked in the age group 20–34. The same kind of social class gradient appears in most other diagnostic groups, but not in alcoholism or alcoholic psychosis. In 1956 for men aged 20 and over, the first admission rate for these two diagnoses combined was 83 per million in Class I, compared with 49 in Class V, and for subsequent admissions 92 compared with 52. The usual explanation of the excess in Class I is that the people in this Class are more or less obliged to get treatment, because of the professional consequences of their addiction, whereas in Class V these sanctions do not apply. Thanks, however, to deaths being coded by the deceased’s occupation at the time of the Census, we have death rates by Social Class for different causes. Figure 1 shows that there was a considerable excess in Class I for deaths from cirrhosis of the liver, a condition generally associated with alcoholism.

The fact that Social Class V has higher admission rates than the others for some diagnoses does not necessarily mean that the risk to each individual in Class V of entering hospital is greater than that of people in the other social classes. Risk may be very unevenly distributed. To investigate the occupational subgroups which make up the Social Classes, data for all males aged 20 and over first admitted during 1949–53 were put together, and age-specific first admission rates for 100 occupational groups were produced, for schizophrenia, manic-depressive reaction and all other diagnoses. There was a further distinction made, between single men and those who, whatever their marital status on admission, had been married sometime.

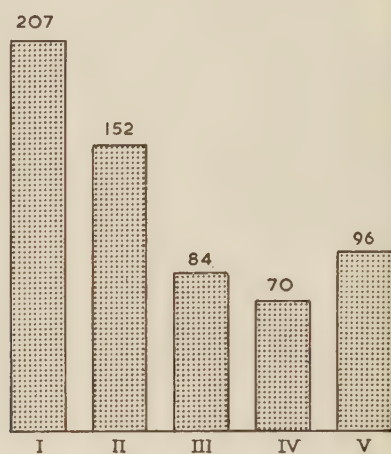
ALCOHOLIC PSYCHOSIS: ALCOHOLISM

Direct Admission Rate per million
males aged 20 and over, 1951



CIRRHOSIS OF LIVER

Standard Mortality Ratios, males
aged 20-64, 1949-53



Social class

FIG. 1.

Table IV shows that for schizophrenia, each of the five occupation groups in Social Class I had lower first admission rates than did the corresponding age-groups in the national average. The numbers in these groups were small, however. But in the remaining four classes there was no such uniformity; some occupational groups had higher and some lower rates than the average. In Class II, for example, farmers and bailiffs, and proprietors and managers of food shops had rates above the average, whereas managers in various occupations had below average rates.

TABLE IV

Five-yearly First Admission Rates for Schizophrenia, per 10,000 Males Aged 20-44, in Five Occupation Groups in Social Class I, 1949-53

Occupation Groups in Social Class I	Single			Ever-married		
	20-	25-	35-44	20-	25-	35-44
1. Financial administrators	7	12	12	18	4	0
2. Engineers, surveyors, architects ..	11	29	29	5	3	1
3. Scientists, doctors, chemists ..	18	26	30	—	8	9
4. Public administrators, journalists, clergy, lawyers	9	38	6	—	3	3
5. Service officers	2	18	38	—	—	4
England and Wales average	29	58	39	6	7	5

Table V shows occupation groups in Social Class III where admissions were above the average. On the other hand, foremen had rates lower than the average; so did passenger vehicle drivers; policemen, firemen, etc. and servicemen (other ranks). It seems that the low rates here may be due to personnel selection for these occupations. Selection may also account for the lower than average rates in groups paid largely on a commission basis, such as commercial travellers, insurance brokers, agents and canvassers and roundsmen and van salesmen.

Even in Class V itself, there was a considerable variation in rates between occupation groups. Among the schizophrenics, costermongers and newspaper

TABLE V

Five-yearly First Admission Rates for Schizophrenia per 10,000 Single Males Aged 20-44, in Certain Occupation Groups in Social Class III, 1949-53

Certain Occupation Groups in Social Class III						Single Males		
						20-	25-	35-44
Hewers and getters of coal	..	..	..	..	..	67	122	53
Machine erectors, millwrights, etc.	..	..	..	..	..	33	68	43
Textile goods workers	..	..	..	..	..	44	80	44
Certain transport workers in Class III	..	..	..	..	..	59	89	50
Clerks	..	..	..	..	..	38	71	48
England and Wales average	..	..	..	..	..	29	58	39

sellers, and warehousemen's and storemen's assistants had rates below the national average. The very high rates in Class V appeared to be due to two occupational groups, kitchen hands and labourers (see Table VI).

TABLE VI

Five-yearly First Admission Rates for Schizophrenia per 10,000 Single Males Aged 20-44, for Kitchen Hands and for All Labourers, 1949-53

						Single Males		
						20-	25-	35-44
Kitchen hands	..	..	..	..	..	136	159	121
All labourers	..	..	..	..	..	52	102	64
England and Wales average	..	..	..	..	..	29	58	39

Dock labourers, however, had rates much below the average. The conditions of employment of these men are different from those of other labourers. As they have to be registered with the Dock Labour Board, their employment is more stable. Also, as Young and Wilmott showed in their studies of Bethnal Green, sons tend to follow their fathers into this occupation. It seems, therefore, that the high rates in Class V are concentrated in these two occupational groups; kitchen hands and labourers; in both of these we should expect to find a high proportion of casual labour, and they might prove suitable temporary occupations for the unstable.

Another thing which shows up very prominently in our national statistics is that the distribution of hospitalized mental illness is very different among single people from among those who, whatever their marital status on admission, have been married at some time or other; with due apologies to Damon Runyon, we have called these, for brevity's sake, the ever-married.

TABLE VII

First Admission Rates by Marital Status, 1954. Rates per 100,000 of the 1951 Census Population in the Corresponding Sex-Age-Status Groups

Age Groups				Males		Females	
				Single	Ever-married	Single	Ever-married
15-	..	..	..	49	104	48	79
20-	..	..	..	99	44	92	80
25-	..	..	..	242	77	191	123
35-	..	..	..	248	76	176	112
45-	..	..	..	246	94	214	131
55-	..	..	..	258	124	199	137
65-	..	..	..	267	148	234	179
75-	..	..	..	308	254	346	299
85 and over	..	..	..	276	392	536	383
15 and over	..	..	..	148	104	143	140

Table VII shows that for most age groups single males have very much higher rates than the married, and admission rates are mostly higher among single than among married women. The female rates were intermediate between those for single and married men.

Allowing for the higher rates among single as compared with married men, the social class gradient in the 5-yearly first admission rates for schizophrenics was very similar for the two groups (Table VIII).

TABLE VIII

Five-yearly First Admission Rates for Schizophrenia by Social Class, for Single and Ever-married Males Aged 20 and Over, 1949-53. Rates per 10,000, 1951 Census Population

Marital Status				Social Class				
				I	II	III	IV	V
Single	..	..	..	16.4	25.4	30.8	32.1	68.0
Ever-married	..	..	..	2.32	2.34	3.91	4.03	7.99

For single men the rate in Class V was 4.1 times that in Class I and for the ever-married 3.4 times.

THE IMPORTANCE OF LONG-TERM STUDIES IN EPIDEMIOLOGY

One great advantage has accrued to us through having a system of mental hospital statistics in which record cards for individual patients are all sent to a central office, and which also results from having the bulk of our mental hospitals in the National Health Service. It is possible to bring together, for each patient, the records of different hospital visits, and so to build up a continuous hospitalization history. No matter how many different hospitals a person goes into, his records can all be paired up at the General Register Office. This kind of approach, which deals with patients as persons, rather than as admissions and discharges, seems essential to the study of mental illness. Are mental hospital admissions scattered at random over the population or are the bulk of admissions due to a smaller group who keep coming and going—who are perhaps hospital-prone, as some people are accident-prone? How many who have left hospital relapse and at what intervals? What proportion of their total time do they spend in hospital? How do these data vary with sex, age, status, diagnosis, social class? This is the type of question to which we hope to provide an answer.

We have, therefore, formed an Index from the cards for patients first admitted during 1954-56, and on the backs of the Index Cards we enter the data of discharge and readmission as we receive cards for these events. At the same time, a cumulative total is built up of time spent in hospital, irrespective of the number of visits. The method of follow-up is to take the patient's admission date, and consider his position on the corresponding date, 3 months, 6 months, one or two years later, whether in or out of hospital or having died in hospital. In this enquiry, too, the single patients have been distinguished from the ever-married, and it has been found that their patterns of discharge and retention differ, but that there is a close resemblance between the patterns for single males and females and for ever-married males and females.

Table IX shows that the ever-married left hospital or died in hospital sooner than single people, and a smaller percentage were in hospital

TABLE IX

Percentage of Patients Alive and Still in Hospital on First Visit at Successive Intervals of the First 2 Years After Admission

				Percentage at End of				
				3	6	9	1	2
				Months	Months	Months	Year	Years
All diagnoses:								
Single			Males	48	28	21	18	14
			Females	52	33	26	22	16
Ever-married			Males	29	16	12	10	6
			Females	35	21	16	14	9
Schizophrenia:								
Single			Males	65	36	27	23	18
			Females	68	41	30	26	20
Ever-married			Males	48	26	19	16	12
			Females	52	28	21	17	12
Manic-depressive reaction:								
Single			Males	36	20	15	13	9
			Females	38	20	16	13	9
Ever-married			Males	21	10	7	5	3
			Females	23	11	7	6	4

continuously for 2 years. All four groups (single males and females and ever-married males and females) with manic-depressive reaction left more quickly than the schizophrenics and a smaller percentage stayed in hospital throughout the two years.

These results are for all ages; the differences between the single and ever-married may be partly accounted for by the higher proportion of deaths among the latter, which may in turn be linked to the higher age-structure of the ever-married groups. We have still to examine individual age-groups, which will no doubt produce varying patterns.

TABLE X

Total Percentage Time Spent in Hospital, Irrespective of the Number of Visits, in the Two Years Following First Admission

				Percentage of Two Years							
				-10	-20	-30	-40	-50	-70	-85	-100
Schizophrenia:											
Single:											
Males 15 and over		..	19	22	13	7	5	7	4	23	
Females 15 and over		..	18	21	14	8	5	6	3	25	
Ever-married:											
Males 20 and over		..	31	22	13	5	3	6	4	16	
Females 20 and over		..	30	22	12	7	4	6	3	16	
Manic-depressive reaction:											
Single:											
Males 20 and over		..	47	19	8	4	3	4	2	13	
Females 20 and over		..	43	20	8	5	4	4	3	13	
Ever-married:											
Males 25 and over		..	60	19	6	3	2	3	2	5	
Females 25 and over		..	57	19	7	4	3	3	2	5	

Table X shows similar distribution patterns of total time in hospital for single males and females, and for the ever-married, but diagnostic patterns vary.

It seems to me that these Tables show that different factors are influencing the hospitalization patterns of single as opposed to ever-married people. Whether some form of premarital selection is at work, whether single people are hospitalized more readily because there is no one to look after them and discharged more slowly for the same reason, and other similar questions cannot be answered by national statistics. We look to the research workers to unravel the complex of conditions which produce the patterns we have found.

NATIONAL STATISTICS AND THE ECOLOGICAL APPROACH

The ecological distribution of mental illness is something which has been arousing interest since the pioneer work of Faris and Dunham in Chicago, and this approach has been used with effect by Sainsbury in his study of Suicide. It does not seem, however, that Dunham's original idea has been followed up, and a recent paper of his in the *International Journal of Social Psychiatry* (12) seems to me to confirm this. He emphasizes that "the central objective in the sociological study of mental disorder is twofold: first to isolate those social variables that are causative or predisposing in the aetiology of the several types of mental disorder, and secondly, to isolate those complexes of social conditions that are associated with high incidence rates of the various disorders."

What seems usually to be done, is to take some administrative areas, such as wards or boroughs, and find the admission rates to mental hospitals for these areas. The Census volumes are then used to find, for example, the percentage of one-person households, or the extent of overcrowding, as measured by the number of persons per room, and these data are correlated with the hospital admission rates. It may be that high admission rates are found where there is a high proportion of one-person households. This is not the same, however, as showing that there is a high admission rate from one-person households. To test whether this is so, we need to know (a) the number of patients admitted from one-person households and (b) the number of one-person households. But a first essential is to delimit the areas from which the patients are coming. Statistics are usually presented for administrative areas, but there seems no reason why mentally sick people should be affected by administrative boundaries. Mental hospital patients may have a random geographical distribution by residence or they may be concentrated in certain areas.

Since the cards for all hospitals come into a central office, patients admitted from any given area can be selected by their addresses, no matter what hospital they go into. We have started by taking patients first admitted in 1954 and 1955 from ten London boroughs, and have plotted their places of residence on maps. Where patients came from a short street, their residence was marked in the middle of the street; for very long streets an approximate distribution was made. The patients were distinguished by marital status. The maps indicate that there is a concentration of single people in what might be termed the "lodging house" areas, that is the kind of area where large old houses are let out in one-roomed flatlets. We have already noticed that single persons have higher first admission rates than the ever-married. Is this due to the circumstances in which they live, or do they happen to live in certain areas because these provide the type of accommodation they can afford or, indeed, obtain?

We have also plotted the male patients by their social class, and this provides an interesting example of the way in which the various social classes are mingled in what are sometimes called the better-class boroughs.

It is, perhaps, possible to see the rudimentary form of some patient-producing areas. We intend to feed into the maps several more years' first admissions and also to cover other diagnostic groups; at present we have limited the cases to schizophrenics, manic-depressives, and people with senile psychosis with or without mention of cerebral arteriosclerosis. If it is possible to find such foci of mental illness, we shall have provided the psychiatrists, sociologists, and anthropologists with areas for intensive study of the interaction between the environment and the mentally sick person. It is hoped that this will prove some help in investigating the aetiology of mental illness.

When statistics are collected year by year, there is no need to ask always for the same data. Provided certain basic information is obtained yearly, other questions can be added to the record card for limited periods. To try to find out the relative mobility of different types of patients we asked for a short time, in addition to address, "how long has the patient lived here?" Another year we asked about the age of finishing full-time education, which in this country is closely linked with the type of education. From this we shall make a study of patients with high educational status and low occupational grade, and low educational status with high grade occupation; these two groups can then be compared with those whose levels of occupation and education are more closely adjusted. Since many items such as occupation, and area of residence, are asked at the time of the Census, the General Register Office always has a nucleus of people who are experts in coding these data, and can also provide basic population distributions to use as denominators when rates are required.

CONCLUSION

People complain that national statistics deal only with large masses of people, whereas the physician has to deal with small groups. They do, however, tell us quite a lot about the average patient, and so provide a basis of comparison against which results from small groups can be set. It is by seeing which groups of patients differ significantly from the average patient and then setting ourselves to find out why, that knowledge can advance. In statistics, numbers are seldom of much use for comparison; rates are required, and here national statistics have an advantage, because the office which provides them can also provide population distributions on which rates can be based. In national statistics uniformity of coding and interpretation can be obtained, because all documents are being handled by the same people. National statistics again, are useful in the international field and we are considering comparisons which can be made with the U.S.A. and Canada. Such comparisons will, we hope, have a bearing on the epidemiology of mental disorder. We do, however, recognize their limitations. They will tell you "what", but they will not tell you "why". They will show up the areas which need to be explored. It is often said that statistics raise more problems than they solve. We hope that our national statistics will not only raise problems about the epidemiology of mental disease, but also make some small contribution towards solving them.

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SIZE CONSTANCY AND ABSTRACT THINKING IN SCHIZOPHRENIC PATIENTS*

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INTRODUCTION

FOR many years both clinicians and researchers have been interested in the thought disorders found in schizophrenic patients. Bleuler (4) believed that "weakness" or "looseness" of association was the primary disorder in schizophrenia. However his views were based on the associationist approach to the theory of thinking, which was buried a long time ago by the advent of Gestalt psychology, and even before that by the work of the "Denkpsychologie" school of Würzburg. The founders of the Würzburg School, Külpe, Ach, Watt and Marbe (31, 1, 56, 34) showed conclusively that the thinking process cannot be reduced to association of ideas and they introduced the concepts of "aufgabe" and of "einstellung", which represented some kind of imageless directional and selective influences in the thought process. A suggestion was made by Paul Schilder (47) that it was this super-ordinate directionality and selectivity of thought process which was affected in schizophrenia. An attempt to apply the principles of formal Aristotelian logic to schizophrenic thinking was made by Von Domarus (17) who found that schizophrenics tended in their propositions to identify the subject with the predicate.

During the past thirty years the main interest as far as schizophrenic thinking is concerned has centred on concept formation. The pioneering work of Vigotsky (55) in Russia was continued in America by Hanfmann and Kasanin (22) and also by Rapaport (39) who investigated the performance of schizophrenic patients in object sorting tests. Benjamin (3) found that schizophrenic patients interpreted proverbs "literally" and that they could not generalize from them. Although it is widely accepted that the ability to form "abstract" concepts is impaired in schizophrenic patients, that their thinking is "concrete", there is no consensus of opinion in the matter. By and large there are three schools of thought. The first is represented by the views of such workers as Vigotsky, Kasanin, Hanfmann, Goldstein, Bolles, Storch, Zeigarnik, Babcock and Rapaport. This school maintains that the essence of the schizophrenic thought disorder is an inability to form abstract concepts. Schizophrenic thinking is concrete and is similar to the disorder of thought occurring in patients with organic brain damage. "Concrete-abstract" is the most important dimension used in the description of concept formation by this school.

* Approved by the Saskatchewan Committee on Schizophrenia Research.

The most representative of the second school of thought are the views of Norman Cameron (12, 13), Stack Sullivan (51) and, more recently, Whiteman (60). These authors maintain that schizophrenics are as abstract in their thinking as are normals and that the peculiarity of their concept formation is due to their autism, lack of "publicness", as it were, in their thinking; schizophrenics do not use the social standards in their concept formation, they do not monitor their thinking from the point of view of the outside society and do not shape it according to the social norms. It is the interpersonal relations, the "role taking" to use G. H. Mead's term, the communication which suffer, but not the ability to abstract. "Private (autistic)-public (social)" is the most important dimension used by this school in description of schizophrenic concept formation. The psycho-analytical views on schizophrenic thinking, which stress the "ego weakness", the "narcissism", the "primary process", and the lack of "reality testing", can be classified as belonging to this school.

The third school of thought is represented by such workers as Paul Schilder (47) and Chapman (14, 15) who stress over-inclusiveness of schizophrenic concepts and also distractability by irrelevant stimuli. According to these workers schizophrenics tend to form very wide, over-inclusive, too general, poorly delineated concepts. These concepts include irrelevant material. "Span" or "range" of concepts is the most important dimension stressed by this school.

Both the first and the third school of thought presuppose an impairment of cognitive functioning in schizophrenic patients. An assumption of impairment of cognitive functioning brings in the question whether the general level of intelligence is impaired in schizophrenic illness.

One can ask, for instance, how the ability to abstract could be separated from the general level of intelligence or intellectual functioning. If one accepts the multi-factorial theory of intelligence, ability to abstract will be one of the factors. If one accepts the uni-factorial theory of intelligence there is a great likelihood that the ability to abstract will be highly correlated with or saturated by the general factor—Spearman's "g". Another factor which influences concept formation is that of language. As Sapir (45) and Whorf (61) pointed out, language is a mould which categorizes and classifies the surrounding world. In many schizophrenics the use of verbal tags and associations may mask an inability to abstract and categorize. These considerations point on the one hand to the difficulties confronting any study of the thought processes in schizophrenics and, on the other, to the need for a broader theory of cognition which would take into account the complexity of the relationships.

Perceptual processes in schizophrenic patients in contrast to thought processes have raised, until recently, rather limited interest. This was due to several factors: Kraepelin and his pupils could not find any major sensory changes in schizophrenic patients when they applied experimental techniques developed in Wundt's laboratory. They followed Wundt and understood by "perception" elementary sensory processes, such as sensory thresholds, and classified more complicated perceptual processes involving "meaning" as "apperception". As the result of these studies Kraepelin concluded "that there are no perceptual changes in dementia praecox". Kraepelin's authoritative statement was soon afterwards bolstered by Bleuler's statement about the "clear sensorium" of schizophrenics. This was incorporated into all textbooks of psychiatry and was accepted by two generations of psychiatrists. Investigation of sensation and perception by laboratory methods ceased to be in

vogue, as the main interest turned towards emotional factors propounded by the "Depth Psychologies".

However, the last twenty years or so have seen a tremendous upsurge of interest in the study of perception. Due to the writings of the Gestalt school of psychology, perception acquired much wider connotations; it came to denote those processes classified by Wundt as "apperception". This broadening of the concept of perception gave impetus to the "New Look" movement in perceptual research, which tried to understand perceptual processes in terms of needs, emotions, personality traits, and so on. Soon "higher" cognitive processes began to be approached through the study of perception. The Gestalt school approached the problems of thinking and learning through perception. Goldstein and his followers explained concept formation or "categorical attitude" in terms of the ability to break down "gestalts" and to form new "gestalts"; and also the ability to perceive and differentiate clearly between figure and ground (20). In more recent years, Michotte (35), Piaget (37, 38), Ames (2), Brunswik (10), Bruner and Postman (8) and Gibson (19) have approached problems of cognition through perception. At the same time Phenomenological and Existentialist schools in psychiatry became interested in the perceived and "experienced" world of mental patients. All these indicate a revived interest in the perception of mental patients.*

Constancy of perception is an aspect of perception which has very broad connotations for the cognitive process as a whole. It is one of the basic mechanisms of adjustment to the environment. It allows the subject to perceive stable objects in the external world instead of an ever-changing flux of stimulation. Within wide limits, it maintains the perceived environment constant, thus it is a homeostatic mechanism of great importance for the biological adaptation of the organism. It allows one to perceive and to "know" the environment in terms of stable and probable "things". Various workers commented on the similarity between classifying a percept as representing an object and classifying an object as representing a certain conceptual category. Thus for Klüver (28) these are special cases of "stimulus equivalence". It can be regarded as the ability to recognize certain "situations" or "things" as identical. Piaget (37, 38) compares this tendency to the conservation of energy in physics. Michotte (36) talks about the tendency to identify a "cachet spécifique" or essential quality as being basic in both perception and in thinking. Bruner, Goodnow and Austin (7) state that "categorization at the perceptual level consists of the process of identification, literally an act of placing a stimulus input by virtue of its defining attributes into a certain class . . . The act of identification involves a 'fit' between the properties of a stimulus input and the specification of a category. Categorization of conceptual objects also involves the fit of a set of objects or instances to the specification of a category." Constancy of perception is a very important mechanism serving this perceptual categorization. It enables one to perceive a "thing" of a certain size, shape and colour at a certain distance, at a definite place in the three-dimensional space, thus having an identity and continuity.

Recent research has shown that constancy of perception is poorer in schizophrenics. Size constancy† in these patients has been investigated by

* Witness recent monograph by Eysenck, Granger and Brengelmann (18).

† Size constancy is that characteristic of perception which allows one to perceive, within certain limits, an object as being the same size independently of its distance. Thus it enables one to perceive according to the "real", physical size of an object and not according to the visual angle.

Raush (40), Weckowicz (57) and Crookes (16). Raush found that paranoid schizophrenics had increased size constancy compared with normals and other schizophrenics. He predicted that in other types of schizophrenia size constancy might be poorer than in normals. However the difference found by him was not statistically significant. Weckowicz found that chronic hospitalized schizophrenics had poorer size constancy than other hospitalized patients and normals. He also found that during each individual size constancy experiment the performance of individual schizophrenics was significantly more variable than that of normals and non-schizophrenics. (The intra-individual variance was higher.) Crookes came to the same conclusion regarding poor size constancy in schizophrenic patients. He also found that in these patients there was a positive correlation between poor size constancy and "literal" responses to the Rorschach ink blots. By "literal", he meant responses in which ink blots were perceived as ink blots, patches of paint, clouds, and so on, which was not far from their real nature. Weckowicz, Sommer and Hall (58) have reported that chronic schizophrenic patients show poor distance constancy and that this is related to the poor size constancy in these patients. These investigators concluded that schizophrenic patients live in a "visual world" which is lacking in depth ("three dimensionality") and the perception of these patients is more "literal" and less related to the "third dimension" than the perception of normals. Weckowicz (57) also reported that although on average size and distance constancies in schizophrenics are significantly lower than in non-schizophrenics, yet the variation from subject to subject was in these patients greater than in the controls. While most schizophrenics showed low size constancy, some of them deviated in the opposite direction and showed extremely high size constancy. Paranoid schizophrenics with comparatively little thought disorder seemed to have high size constancy, while hebephrenics with much thought disorder showed low size constancy.

PRELIMINARY INVESTIGATION

A pilot study was conducted on 20 schizophrenic patients to whom were administered: a simple sentence completion test (sentences describing well-structured situations such as "John looks out of . . ."), the Similarities and Comprehension Scales of the Wechsler-Bellevue and the interpretation of three proverbs. The patients were ranked purely impressionistically from the test protocols according to the amount of what was considered to be "schizophrenic disorder of thought". The same patients were given a test of size constancy and ranked according to the results. Rank-difference Spearman correlations were for 7.5 m. distance $\rho = .31$ ($p = 0.05$), and for 15 m. distance $\rho = .41$ ($0.05 > p > 0.01$). These correlations were in the expected direction and significant. They showed that there was a positive correlation between thought disorder and low size constancy. (This applied to the similarities, comprehension and proverb tests, but not to the sentence completion test.) However the method of assessment of thought disorder was impressionistic and its reliability had not been established. It was therefore decided to carry out another experiment with a larger sample, more clearly defined criteria of schizophrenic thought disorder and measures whose reliability would be ascertained. After reviewing the literature the decision was made to limit the study of schizophrenic disorder of thought to that aspect which is concerned with concept formation.

GENERAL HYPOTHESES

The experiment reported in this paper was conducted primarily to test the hypothesis that there is a positive correlation in schizophrenic patients between size constancy and ability to form concepts. To put it in more general terms there is a positive correlation between constancy of perception and capacity for abstract thinking. However to explain a relationship between constancy of perception and concept formation, a more general cognitive hypothesis was required which would include both the phenomenon described as constancy of perception and the phenomenon described as concept formation. As it was mentioned in the introduction, there are three schools of thought in contemporary clinical psychology with regard to the theories of impaired concept formation in schizophrenic patients. The first stresses the impaired ability to "abstract". The second implicates "autism" and social "disarticulation". The third emphasizes the "over-inclusiveness" of schizophrenic concepts believed to be due to "distractability" by irrelevant stimuli, mainly internal. Therefore this last group of theories considers that the disorders of concept formation are secondary to those of attention.

Accordingly, three general hypotheses were formulated as follows:

1. There is a redundancy of information in the sensory input from the environment to the organism. The "cognitive process" is to a great extent concerned with reduction of this redundancy and with "selection" or "abstraction" of some information according to certain principles and suppression of all other information. In the perceptual process it will manifest itself in the ability to perceive stable "things" or objects, in spite of a constant change in the sensory input—the ability which is usually described as "constancy of perception". It will also manifest itself in more artificial perceptual tasks such as the ability to "break down gestalts" (e.g. tasks using embedded figures). The rationale for this is as follows: constancy of perception depends on selecting certain cues and rejecting other cues. Therefore it could be related to the ability to break down gestalts, if, by gestalts, are understood primary and total configurations of visual cues, which are perceived "literally", as a pattern of light and not as denoting certain objects. Crookes' finding mentioned before is relevant here that in schizophrenics, poor size constancy correlates highly with "literalness" of the Rorschach responses. In the thought process this selectivity will manifest itself in the ability to form stable "classes" of "things" or objects, which is the essence of concept formation.

Thus there is a common factor involved in constancy of perception—ability to "break down" gestalts and capacity for abstract thinking. If this factor is affected by schizophrenic illness there should be a positive correlation between constancy of perception, ability to break down "gestalts" and capacity for abstract thinking. In the special case of the experiments reported in this paper there should be a positive correlation between poor size constancy, impaired ability to see embedded figures and impaired ability to form concepts.

2. Both perception and thinking are determined by social learning and therefore by the habits of perceiving and thinking existing in a given social group as a part of its cultural pattern. Constancy of perception is related to the ability to "recognize" culturally familiar objects. Concept formation is determined by the "give and take" of social inter-communication in the context of a linguistic pattern. In schizophrenic patients both perceptual and thought disorders are due to an estrangement from society. Thus poor constancy of perception should correlate positively with "bizarreness" and

"autism" of schizophrenic thought. (It is a well-known fact that some products of schizophrenic thinking process are quite "abstract", but according to the social standards very unusual.) If this hypothesis is true, then in the experiments with schizophrenic patients reported in this paper, poor size constancy should correlate positively with "bizarreness" of schizophrenic concepts rather than with their "abstractness". There should be no correlation of either to the performance on an embedded figure test.

3. Both disorders of perception and thinking in schizophrenic patients are secondary to a disorder of the span of attention, which can be too broad or too narrow, or may alternate between the two. Constancy of perception, and in this particular case, size constancy, depends on the ability to perceive a thing in its context, a figure together with its background, or to take into the account all the "cues" existing in the whole perceptual field. Thus it is related to "broadness" of attention. "Over-inclusiveness" or wide span of schizophrenic concepts is related also to "over-broadness" of their attention, which makes them incapable of excluding irrelevant stimuli. On the other hand, the ability to perceive embedded figures is related to "narrowness" of attention which causes the distracting, embedded figure to be excluded. Therefore if this hypothesis is true in schizophrenic patients, "over-inclusiveness" or over-wide range of concepts should be positively correlated with good size constancy and negatively with poor size constancy. Size constancy and concept range should correlate positively with the number of objects sorted in the Active part of the Goldstein Scheerer Object Sorting Test. The performance on the embedded figures tasks should be negatively correlated with good size constancy, positively correlated with poor size constancy and negatively correlated with "over-inclusiveness" or wideness of concept range.*

As one can see, these theories are logically not mutually exclusive, but stress different aspects of cognitive process.†

Since it is commonly believed that personality and thinking process are usually better preserved in paranoid schizophrenia than in other types of schizophrenia and since this may be related to the selectivity function investigated in this study, the following additional hypothesis was tested: Paranoid schizophrenics show better size constancy and better preserved ability to form concepts than patients suffering from other types of schizophrenia.

SAMPLE

Forty chronic schizophrenics were used as subjects. In all cases the diagnosis of schizophrenia had been firmly established by all the psychiatrists who had examined them. There were 30 males and 10 females. Fifteen patients were diagnosed as paranoid, 12 as hebephrenic, 3 as simple, 4 as catatonic and 6 as undifferentiated schizophrenics. However, the clinical picture frequently did not correspond to the original diagnosis. The mean age of the subjects was 38 years (S.D.=8.7 years). The average length of stay in the hospital was 7 years, 8 months (S.D.=6.12 years). No patient in whose case there was a

* This theory was put forward by E. Calloway (11) in his work on the influence of sympatheticomimetic drugs on perceptual and thinking process in normal subjects.

† Both first and third hypotheses may be called "attention" hypotheses. They deal with two different aspects of attention. The first hypothesis deals with the ability to attend selectively, to control attention, and to resist distraction; the second hypothesis deals with the "span" of attention. Because of the introspective connotations of the concept of attention going back to the Titchenerian concept of "attensity", the authors prefer more functional concepts of "set" or "selectivity" for the first hypothesis and "the span of the cognitive field" for the third hypothesis.

possibility of mental deficiency or organic brain disease was included. No patient undergoing insulin or electric shock treatment was included. Only patients who would co-operate in the experiment were included in the sample. All the subjects had visual acuity 20/20, corrected or uncorrected.

METHOD

Tests

A. The following tests were chosen to assess the capacity to form concepts or abstractness of level of thinking:

1. Similarities Test from Wechsler-Bellevue.
2. Benjamin's Proverb Test.
3. Goldstein-Scheerer Object Sorting Test
 - (a) Active form.
 - (b) Passive form.
4. Goldstein-Scheerer Colour-form Sorting Test.*

B. Two tests were used to test the ability to break down gestalts:

1. Letter Finding Test.
2. Gottschaldt's Figures.

C. The Stroop Test was used to test the ability to attend selectively and to resist distraction.

D. In addition, two other subtests from Wechsler-Bellevue were used to assess the level of general intelligence in our subjects.

1. Vocabulary scale. It was thought that this test would give a measure of the level of intelligence before the onset of the illness.
2. Comprehension scale. This test was also used as a measure of intelligence, reflecting the present level of functioning.

E. Size constancy was measured in the following way: the apparatus consisted of a white painted box standing on a white painted table with a white screen behind it. There was a black rod (0.5 cm. in diameter) in the top of the box, which could be adjusted to different heights (0-20 cm.) from behind the screen.

Another white painted screen in front of the box could be removed and put back again. There was another table painted white, of the same size and shape as the first table, to which was attached a white box the same size and shape as the first box with a black rod which could be adjusted to different heights (0-20 cm.) by pushing a handle behind the box. On the other side of the table was fixed a chin support.

A long corridor was used which was lit with electric lights. All external light was carefully excluded. Care was taken to maintain a standard arrangement of objects, so that visual cues would not change. The subject sat behind the second table with his chin on the chin support and his hand on the handle for adjusting the rod on the top of the box 44 cm. in front of him. The other table was placed at a distance from the subject. Two distances were used for each subject, the first 7.5 m., the second 15 m. The experimenter sat behind the screen. The subject was told to adjust the black rod on the top of the white

* Goldstein-Scheerer Colour-Form Test taps two functions: (1) ability to abstract; (2) ability to shift from one conceptual framework to another.

box in front of him to the same size as the black rod which he saw at a distance. He was told to use both eyes and to make matches of the real, not the apparent size. The experimenter showed the sizes of the rod in a standard order, different for 7.5 m. distance and 15 m. distance. Twenty standard sizes were shown at either distance. Each time the size of the rod was being changed, the white screen was put in front of the box, thus preventing the subject from seeing the movement of the rod.

The adjustments of the rod made by the subject were read and recorded by an assistant. Each adjustment was recorded in centimetres as an error, either plus or minus from the standard size displayed to the subject from the distance. (The accuracy was to one decimal point.) These errors were added up and the average error was calculated, which became the score of size constancy for each subject. In addition, standard deviation of individual errors from the average error of each subject was calculated which became the measure of the variability of the performance of each individual.

These tests were administered on the same day.

Scoring

As far as scoring was concerned the main difficulty was to evolve a reasonably reliable measure of the quality of functioning independent of the general level of functioning, which is measured by I.Q. In measuring the quality of functioning, it was important to keep as much as possible "concreteness" separate from "autism".

Two scores of I.Q. were obtained. First the Vocabulary and Comprehension tests from the Wechsler-Bellevue were scored according to the Wechsler-Bellevue scoring method. As was mentioned before, it was believed that the Vocabulary Test would give the most dependable measure of I.Q. before the onset of illness. However it was felt that if this test was scored strictly according to Wechsler-Bellevue standards, the original I.Q. of the subjects would be underestimated, as many bizarre answers, indicating that the subject knew the meaning of the word, could not be given even half a credit. Therefore it was decided to use a more lenient score and give half a credit to an answer which indicated that the subject knew the general meaning of the word. For instance, if the subject, asked to explain the meaning of the word "belfry", answered, "Hell's bells", it was assumed that the subject originally knew the meaning of the word and he was given half a credit for such an answer. To establish the reliability of this procedure, corrections of the standard score were made by two authors independently of each other. Pearson's product moment correlation between two sets of scores was $r = .63$. The corrections were discussed again and finally a set of corrections was arrived at to which both authors agreed. From the corrected vocabulary score the I.Q. was derived by the standard method. This I.Q. was believed to be the measure of the level of intelligence before the onset of illness. It will be referred to in the rest of the paper as I.Q. "A".

The second measure of I.Q. was derived from the Vocabulary and Comprehension subtests of Wechsler-Bellevue by the standard procedure. This I.Q. was the measure of the present level of intelligence and was usually lower than the I.Q. which measured the premorbid level of intelligence. It will be referred to in the rest of the paper as I.Q. "B".

Pearson's product moment correlation between these two measures of I.Q. in the subjects was $r = .85$. (The Similarities subtest was not included in

the measure of I.Q. because it was used for measuring the level of abstractness.)

So much for the level of functioning. In order to assess the quality of functioning, the responses of the subjects on the Wechsler-Bellevue Similarities subtest, Benjamin's Proverb Test and Goldstein-Scheerer's Object Sorting Test: (a) active, (b) passive forms were taken down verbatim. They were rated independently by two judges on the following dimensions: (1) "Abstract Concrete"; (2) "Public-private (autistic)"; (3) "Span of concept"—(wide-narrow). In the "abstract-concrete" dimension Rapaport's (39) criteria for conceptual level were used. The concept was rated as "abstract" when a generic term describing a class was used. It was rated as "functional" when the common denominator of a concept was a common function and finally it was rated as "concrete" when a concrete attribute of a thing was used for concept formation. When the generic term used was unusually wide, the concept was classified as being "over-abstract". This four-point rating scale was used for each response: "over-abstract", "abstract", "functional" and "concrete".

In rating concepts on the "Public-private" (autistic) dimension, another four-point rating scale was used: from completely public (obvious to everybody in our culture) to completely autistic (completely incomprehensible). The autistic way of categorizing may occur when the common denominator of a concept is a common affect or feeling tone. Bruner *et al.* (8) and also Schachtel (46) and McClelland (32) suggested that affective categories are the most primitive categories, that they go back to early childhood, and may resist conscious verbal insight by virtue of having been established before the full development of language. In that case, "Public-private (autistic)" is not an independent dimension from "abstract-concrete" dimension and "private" (autistic) concepts are examples of the "affective" type of concepts and should be regarded as being on the same or lower level as "concrete" concepts. However some "autistic" "bizarre" concepts appear to be "very abstract" and it was considered profitable to keep the two dimensions independent. "Range" or "span" of concepts was also rated on a four-point rating scale (from very wide to very narrow).

Some additional comment is necessary with regard to Benjamin's Proverb Test. The responses on Benjamin's Proverbs were rated only on "Abstract-concrete" and "Public-private (autistic)" dimensions. Two parts of the answer corresponding to two parts of each proverb were rated separately. Benjamin's (3) method of scoring was adapted to the rating scale, used in conjunction with other tests. The "literalness" of his rating scale was equated with the concreteness of our rating scale, and the "false de-symbolization" and "false abstraction" of his rating scale with the "privateness" or "autism" of our rating scale.

Regarding the special categories of concepts used by Rapaport, concepts which would be scored by his method as "Syncretistic" were scored as "concrete" on the "concrete-abstract" scale and as very wide on the concept "span" scale. Concepts which would be scored according to his method, as "Fabulated" were scored as "concrete" and "private (autistic)". Concepts which would be scored as "Symbolic" were scored as "private (autistic)" but "abstract" and so on. These special classes of concepts could be placed on our scale. Each answer in the Similarities, Proverbs Tests and Active and Passive parts of the Goldstein-Scheerer Object Sorting Test was scored on three independent rating scales. In each test the scores were added up and divided by the number of answers and the resulting figures constituted the score in the given test of Level of Abstraction (Abstract-Concrete), Autism (Public-private)

and Concept Span. In this way subjects who gave only few answers were not penalized and this method of scoring brought forth quality of functioning rather than level of functioning.

For the purpose of calculating correlations, combined scores were derived from "Abstraction Level" and for "Autism". (The concept range rating was found to be unreliable and was discarded.) The scores for Abstraction Level for each test were added up. (Benjamin's Proverb Test was given only half weight because in this test the answer to each proverb had a double score for each of the two parts of the proverb, and otherwise it would have influenced the combined score more than other tests.) This constituted the "Combined Abstraction Level Score". Exactly the same procedure was applied to "Autism" scores on individual tests to derive the "Combined Autism Score".

To have more reliable measures it was decided to use also another method of scoring at least in some of the tests. McGaughan and Moran (33) developed a scoring method of concept formation in object sorting behaviour. These authors modified Rapaport's "conceptual level", they used what they called "conceptual area" in their analysis of object sorting behaviour of schizophrenic patients. Similar to our rating scale, they used also two independent dimensions: "Open-closed", which corresponded roughly to the "abstract-concrete" dimension and "private-public" dimension which was almost identical with the "public-private (autistic)" dimension of our scale. According to these authors "open" concepts are concepts where only one particular characteristic determines membership in a class. For instance if we choose the colour red as our concept, all the objects in the universe which have some red colour can be classified together and at the same time be members of different classes, if classificatory criteria are changed, as these objects can also be wooden and round and what not. Closed concepts are concepts where several characteristics determine class membership, e.g. all red, wooden, round objects with bits of metal in them. In open concepts only one or few "degrees of freedom", as it were, are used, and many left unused; in closed concepts many "degrees of freedom", as it were, are used and few left unused. The limiting case is when one object is equated with one concept because all its characteristics are used to define the concept. It is a case of extreme concreteness.*

This approach to categories is identical with that of Boolean Algebra with its "primary", "secondary", "tertiary" and so on, classes.

The "Private-public" dimension measures conformity of the conceptual categories to the socially acceptable or understandable norms. In their method of scoring McGaughan and Moran do not use continuous variables, but four discrete categories. They use a fourfold scheme and classify each response according to strictly prescribed criteria as (1) Public-Open ("M"), (2) Public-Closed ("H"), (3) Private-Open ("A"), and (4) Private-Closed ("I"). Those interested in further detail are referred to the original articles.

It was decided to use McGaughan and Moran's method of scoring in the Goldstein-Scheerer Object Sorting Test independently from the ratings of "Abstraction Level" and "Autism", described before. Although McGaughan and Moran established the reliability of their method of scoring, in view of our lack of experience with their scoring method it was decided to establish the reliability of this method independently. Accordingly the protocols of the Goldstein-Scheerer Object Sorting Test of our subjects were scored by two independent judges using McGaughan's method.

* These "degrees of freedom" can be also called "cognitive valances". A smaller number of "Cognitive valances" is used up in an "open" concept than in a "closed" concept.

The Goldstein-Scheerer Colour-Form Test was scored in the following way: Complete failure—1, success with colours or shapes—2, success with colours and shapes after help*—3, success with colours and shapes after 30-second delay—4, immediate success with shapes and colours—5.

The two perceptual tests which tested the ability to break down "gestalts" were scored in the following way:

1. Gottschaldt's figures. In this test, described first by Gottschaldt (21) the subject is presented with a series of simple geometrical figures some of which are embedded in a more complex figure. He has to identify the appropriate figure and to trace it in the more complex figure. In scoring it was decided to eliminate the factor of time in order not to penalize lethargic schizophrenics. The score was the total number of successfully identified figures.
2. Letter Finding Test which was described by Sherman (50) who showed that schizophrenic patients gave inferior performance on this test in comparison with controls. In this test the principle of embedded figures is used. The subject has to find letters which are embedded in larger gestalts. He is presented with ten figures which can be broken into an almost unlimited number of letters. The total number of letters found is the score.

The last test used was the Stroop Test. This test measures the ability to attend selectively and not be distracted by irrelevant stimuli. The subject is first presented with a card on which are printed names of colours in black and white. He has to read them as fast as he can. Next he is presented with another card with coloured dots. He has to name the colours of the dots as fast as he can. Last he is presented with still another card where names of colours are printed in "wrong" colours. He has to name the colours in which the words are printed as fast as he can. On these tasks he is timed. It takes longer to read the colours of the words which name "wrong" colours, than to name the colours of the dots. The difference between the times required by the two tasks is the measure of the ability to resist the interference by the meaning of the words when naming the colours in which these words are printed.

The smaller the difference the better the performance. The method of scoring which was used was based on the per cent. increment of time taken for reading coloured words as compared with coloured dots. The formula used was

$$\frac{C-B}{B} \times 100$$

The procedure by which size constancy was measured has already been described. In statistical analysis four scores were used: (1) Average error at 7.5 m. distance, (2) Average error at 15 m. distance. These were the scores of size constancy. Two other scores were the Standard Deviations from the average errors of the twenty readings at 7.5 m. and at 15 m. distances of each subject.

* If a subject had a difficulty with switching from the classification according to colour to the classification according to form, the usual technique of turning over the figures to the other side, which was of the same white colour, was used. If a subject had difficulty with switching from the classification according to form to that of colour, a modification of the standard Goldstein-Scheerer technique was introduced: the three squares and the three triangles were substituted by six circles, bringing the number of circles to nine and presenting the subjects with three sets of circles of different colour.

RELIABILITY

Two independent judges rated the responses in Similarities, Proverbs and Object Sorting Tests independently on three dimensions: (1) Abstract-concrete, (2) Public-private (autistic), (3) Concept Span (range), and also scored the responses in Object Sorting Test according to the McGaughran procedure. Pearson's product moment correlations were calculated as reproduced in Table I.

TABLE I

Tests	Dimensions		
	Abstract- Concrete	Public-Private (Autistic)	Concept-Span
Similarities 	.86	.88	.18
Proverbs 	.79	.79	—
Object sorting (active) ..	.73	.83	.13
Object sorting (passive) ..	.72	.90	.31

The reliability of McGaughran's scoring categories was calculated in the following way: the number of agreements and number of disagreements as to McGaughran's categories were counted. Remembering that agreement could occur by chance in 1 in 4 instances, Chi-squares were calculated.

These were:

1. For Object Sorting Test active form:

$$\chi^2 = 232.96$$

(Contingency coefficient $C = .64$)

2. For Object Sorting passive form:

$$\chi^2 = 614.10$$

(Contingency coefficient $C = .71$)

One can see that the reliability of the "concept span" ratings was too low to be satisfactory. Therefore these ratings were dropped from the further analysis of data. In the case of other scores a satisfactory reliability has been established. Reliability of the correction of the estimation of the premorbid level of I.Q. had been dealt with already, and reliability of size constancy measurement had been investigated before and had been found satisfactory (55).

RESULTS

At this point it is appropriate to derive special hypotheses from the general hypotheses formulated before and to predict on their basis the expected correlations between size constancy measurements and the measurements obtained in various tests.

Because concept span could not be measured reliably the third general hypothesis which relates concept span and size constancy cannot be considered here. The issue therefore will be between the first general hypothesis which can be called the "selectivity hypothesis" and the second hypothesis which can be called the "autism hypothesis".

A. The "selectivity hypothesis" is that constancy of perception and abstract thinking are due to the common factor of cognitive selectivity. If this general hypothesis is true, these two variables should correlate positively

together and also correlate positively with the ability to break down gestalts. The specific sub-hypotheses derived from this are:

1. A positive correlation between the level of abstraction (abstract-concrete) dimension and size constancy.
2. A positive correlation between McGaughran's score of "Openness" of concepts and size constancy.
3. A negative correlation between McGaughran's score of "Closedness" of concepts and size constancy.
4. A positive correlation between the two tests (Gottschaldt's figures and Letter Finding Test) for the ability to break down gestalts on the one hand and size constancy on the other.
5. A positive correlation between the scores on Goldstein-Scheerer colour form sorting test and size constancy.
6. A negative correlation between the score on the Stroop Test and size constancy. (As it was mentioned before, the high score on the Stroop Test means a large difference between the time used for reading the words in colours and the time used for reading the colour dots, therefore it signifies a poor performance. A poor performance on this test can be explained as due to inability to maintain a set.)
7. No correlation between size constancy and "Public-private" (autistic) dimension, provided the latter is not correlated (is orthogonal) to the "Abstract-concrete" dimension.
8. No correlation between size constancy and McGaughran's score on "Public-private" dimension.
9. A positive correlation between the level of abstraction ("Abstract-Concrete") dimension and the two tests of the ability to break down gestalts.
10. A positive correlation between McGaughran's score of "Openness" of concept and the ability to break down gestalts.

As was mentioned before, "selectivity" means selection according to a certain principle or a set. Therefore, if poor size constancy is due to a fault in a mechanism of selectivity, it should correlate positively with variability of performance.

11. Average size constancy scores for each individual should correlate negatively with the scatter of the individual responses from which the average score was derived.
12. There should be a negative correlation between the scatter of individual responses in size constancy experiment and "Abstraction" level (abstract-concrete dimension).
13. There should be a negative correlation between size constancy scatter (intra-individual) variability and McGaughran's "Openness" of concepts score.

Some of these variables may correlate with I.Q., which should be partialled out from those correlations relevant to the major hypothesis.

B. If the second hypothesis is true that constancy of perception is related to the learned cultural factors, that it is due to the way a given culture teaches one to perceive the world, then high score on "Publicness" of responses would be related to high size constancy and "Privateness" of "Autism" to low size

constancy; other correlations should be zero, providing, of course, there is no correlation between the dimensions "abstract-concrete" and "public-private".*

1. Size constancy is positively correlated with "Publicness" (Public-private (autistic) dimension), scored by the method developed by the authors.
2. Size constancy is positively correlated with "Publicness" (Public-private (autistic) dimension), scored according to McGaughran's method.

Before presenting the evidence from correlations in support of these theories, it is necessary to examine the inter-correlation between the tests, which were assumed to measure the same dimension when two measures were obtained under different conditions or two different tests were used to measure the same thing.

These correlations are summarized in Table II.

TABLE II

Size constancy	Measured at 7.5 m. distance	vs.	Measured at 15 m. distance	.64
Intra-individual variability of performance in size constancy	Intra-individual S.D. at 7.5 m. distance	vs.	Intra-individual S.D. at 15 m. distance	.64
Capacity for abstraction	Abstract level Combined score	vs.	"Openness" score according to McGaughran's procedure	.52
Autism	Public-private (autistic) combined, scored according to authors	vs.	"Public-private" scored according to McGaughran's procedure	.89
Ability to break down Gestalts	Gottschaldt's Figures Test	vs.	Letter Finding Test	.33
Intelligence	I.Q. "A" based on vocabulary corrected (supposed to measure pre-morbid I.Q.)	vs.	I.Q. "B" based on vocabulary standard procedure plus comprehension (present I.Q.)	.85

From the Table it can be seen that apart from the correlation between the performance on Gottschaldt's Figure Test and that on the Letter Finding Test, all correlations are quite high. The two tests measuring the ability to break down gestalts are correlated at a significant level ($p < .05$), but it is obvious that these tests measure also some other important factors which are different.

The correlations which are relevant to the "Selectivity Hypothesis" are presented in Table III and Table IV.

Table III presents the correlations between Size Constancy scores and scores of intra-individual variability in size constancy experiment on the one hand and the other tests on the other hand. Table IV presents the correlation between Abstraction Level Combined ("Abstract-concrete") dimension and McGaughran's "Openness" of concepts scores on the one hand and the other tests on the other hand.

It can be seen from the Tables that all the correlations are in expected directions and of the total number of 36, 13 are statistically significant at 1 per cent. or 5 per cent. levels. This proportion of significant correlations is very

* An experiment with size constancy of familiar and unfamiliar objects would be very important in connection with this hypothesis.

TABLE III

TEST	TEST						
	Abstraction Level Combined ("Abstract-concrete" Dimension)	McGaughran Score of "Openness"	McGaughran Score of "Closedness"	Letter Finding Test	Gottschaldt's Figures ¹	Stroop Test	Goldstein Scheerer Colour/Form Test ²
Size constancy, distance 7.5 m.	.33* ³	.43**	.38*	.25	.01 b.s.	— .11	.07
Size constancy, distance 15 m.	.46** ⁴	.31*	.33*	.20	.19	— .06	.02
S.D. at 7.5 m. distance (intra-individual variability)	— .29	— .14	.17	— .25	— .32* b.s.	.24	— .56**
S.D. at 15 m. distance (intra-individual variability)	— .17	— .16	.20	— .05	— .16 b.s.	.21	— .75**

¹ Gottschaldt's Figures scores were converted to square roots to normalize a negative skewness of distribution.

² On account of "J" shared distribution of Goldstein Scheerer's Colour Form Test, biserial correlations were calculated.

³ One asterisk denotes significance at 5 per cent. level and two asterisks at 1 per cent. level. In testing the significance of these correlations two-tail test was used.

⁴ The Abstraction Level ("Abstract-concrete" scores) correlations with size constancy for individual tests are as follows:

Distance 7.5 m.: Object Sorting Active .47, Object Sorting Passive .22, Similarities .10, Proverbs .09.

Distance 15 m.: Object Sorting Active .47, Object Sorting Passive .27, Similarities .29, Proverbs .30.

Thus Active part of the Object Sorting Test correlates most significantly with size constancy.

TABLE IV

TEST	TEST ¹			
	Letter Finding Test	Gottschaldt's ² Figures	Stroop Test	Goldstein ³ Scheerer Colour/Form Test
Abstraction level combined ("abstract-concrete" dimension) score	.52** ⁴	.33*	— .20	.49** b.s.
McGaughran "Openness" of concepts score	.51**	.15	— .27	.01 b.s.

¹ Correlations between Abstraction Level and McGaughran's "Openness" scores on the one hand and size constancy and intra-individual variability of performance in size constancy experiment on the other hand were presented in the previous Table.

² Gottschaldt's Figures scores were converted to square roots to normalize distribution.

³ On account of "J" shaped distribution of the Goldstein Scheerer Colour/Form Test, biserial correlations were calculated.

⁴ One asterisk denotes significance at 5 per cent. level and two asterisks at 1 per cent. level. In testing the significance of these correlations two-tail test was used.

unlikely to be obtained by chance. It can be also seen that all correlations between the size constancy measurements and the measurements of the capacity to form concepts are in the expected direction and statistically significant.

It is important to find out whether these correlations are not spurious on account of their being correlated positively with intelligence. In order to do so the two measures of "I.Q." described previously were correlated with the scores

on the tests dealing with Size Constancy, Concept Formation and Ability to break down gestalts.

The results are presented in Table V.

TABLE V

TEST	TEST									
	Size Constancy, Distance 7.5 m.	Size Constancy, Distance 15 m.	Intra-individual Variability S.D. Distance 7.5 m.	Intra-individual Variability S.D. Distance 15 m.	Abstraction Level Combined ("Abstrac- tion-concrete") Score	McGaughran's "Openness" of Concepts Score	Letter Finding Test	Gottschaldt's Figures	Stroop Test	Goldstein Scheerer Colour/Form Test
I.Q. "A" (I.Q. based on the corrected vocabulary score and assumed to represent the pre- morbid level of intelligence)	.. .01	-.04	-.23	-.31*	.40**1	-.07	.06	.04	-.16	.24
I.Q. "B" (I.Q. based on the standard vocabulary score plus comprehen- sion and repres- enting present level of intelligence)	-.22	.07	-.25	-.22	.50**	.12	.27	.03	-.27	.89**

¹ One asterisk denotes 5 per cent. level of significance, two asterisks 1 per cent. level of significance (two-tail test).

As could be expected, Level of Abstraction-Combined ("Abstract-Concrete" dimension) correlates positively with intelligence. However the correlations between McGaughran's score for "Openness" of concepts and both estimations of I.Q. are not significant. There are negative correlations between the intra-individual variability of performance and the I.Q. measures and positive correlations between I.Q. measures and Goldstein-Scheerer Colour/Form Test. The correlations between size constancy measures are insignificant with two of them being negative, thus confirming N. Jenkin and Morse's (27) finding in mental defectives that size constancy is not related to intelligence.*

These correlations with I.Q. were partialled out from the correlations presented in Tables III and IV. The correlations corrected for intelligence are presented in Tables VI and VII.

Partialling out intelligence did not substantially change the correlations. It increased almost all the correlations between the size constancy measurements and the ability to form concept measures. Thus it may be concluded that the relationship between size constancy and concept formation in schizophrenic patients has been established. As far as the other correlations predicted by the "Selectivity" hypothesis are concerned, there is a definite positive and significant correlation between ability to form concepts and ability to break down gestalts. The other correlations are in the predicted direction, but in most of the cases do not reach the level of significance. Thus the relationship between the size constancy measurements and the ability to break down gestalts is rather tenuous.

Two additional correlations which are important from the point of view of "Selectivity" theory are that between the size constancy measurements and

* Thouless (52) has found a small negative, nevertheless significant, correlation between constancy of perception and intelligence.

TABLE VI¹

TEST		Abstraction Level Combined Score ("Abstract- concrete" Dimension)	TEST			
			McGaughran "Openness" of Concepts Score	Letter Finding Test	Gottschaldt's Figures	Stroop Test
Size constancy distance 7.5 m. ..	I.Q. "A" ²	.36**	.44**	.25	.01	-.114
	I.Q. "B"	.53**	.47**	.33*	.02	-.05
Size constancy distance 15 m. ..	I.Q. "A"	.48**	.31*	.21	.19	-.06
	I.Q. "B"	.49**	.31*	.20	.19	-.04
S.D. at 7.5 m. distance (intra- individual variability)	I.Q. "A"	-.22	-.16	-.24	-.32*	.21
	I.Q. "B"	-.20	-.12	-.20	-.33*	.19
S.D. at 15 m. distance (intra-individual variability) ..	I.Q. "A"	-.05	-.19	-.03	-.15	.17
	I.Q. "B"	-.07	-.13	.01	-.16	.16

¹ I.Q. was not partialled out from the Goldstein Scheerer Colour/Form Test correlations, because these correlations were biserial. The McGaughran "Closedness" of concepts score correlations has also been omitted on account of its high negative correlation with the McGaughran "Openness" score.

² I.Q. "A" and I.Q. "B" were partialled out and the partial correlations appropriate to these I.Q.s are in the corresponding rows.

³ One asterisk denotes 5 per cent. level of significance and two asterisks 1 per cent. level of significance (two-tail test of significance was used).

TABLE VII¹

TEST		TEST		
		Letter Finding Test	Gottschaldt's Figures	Stroop Test
Abstraction level com- bined ("abstract- concrete" dimension score)	I.Q. "A" ²	.54**	.35*	-.15
	I.Q. "B"	.47***	.37*	-.07
McGaughran "open- ness" of concepts scores	I.Q. "A"	.52**	.15	-.29
	I.Q. "B"	.50**	.14	-.25

¹ I.Q. was not partialled out from the Goldstein Scheerer Colour/Form Test correlation because these correlations were biserial.

² I.Q. "A" and I.Q. "B" were partialled out and the partial correlations appropriate to these I.Q.s are in the corresponding rows.

³ One asterisk denotes 5 per cent. level of significance and two asterisks 1 per cent. level of significance (two-tail test of significance was used).

the measurements of intra-individual variability of performance in size constancy experiment. After average errors for each subject were correlated with the standard deviations of individual responses in each subject from these average errors, the following correlations were obtained:

Distance 7.5 m.	r= .03
Distance 15 m.	r= -.41

The first correlation is not in the expected direction and insignificant, the second is in the expected direction and significant at 1 per cent. level. So much for the evidence in favour of the "Selectivity" hypothesis.

On the basis of the second hypothesis the "Autism" hypothesis, the prediction was made that the size constancy scores will correlate with the combined "Autism" ("Public-private" dimension) scores and with the McGaughran "Public" scores.

These correlations and also the correlations with intra-individual variables of performance in size constancy experiment are presented in Table VIII.

TABLE VIII

TEST	TEST			
	Size Constancy Measures		Intra-individual Variability of Performance Measures (S.D.)	
	7.5 m. Distance	15 m. Distance	7.5 m. Distance	15 m. Distance
"Autism" ¹ ("public-private" dimension)	.11	.20	— .49***	— .25
McGaughran ² "public" scores	.10	.22	— .36*	— .15

¹ The correlations of the scores in the individual tests on "Autism" ("Public-private" dimension) with size constancy are as follows:

Distance 7.5 m. Object Sorting Active $r=12$
Object Sorting Passive $r=.14$
Similarities $r=.10$
Proverbs $r=.02$
Distance 15 m. Object Sorting Active $r=.25$
Object Sorting Passive $r=.21$
Similarities $r=.15$
Proverbs $r=.07$

² A high correspondence between correlations with "Autism" scores and with McGaughran "Public" scores can be predicted from the fact that these two variables correlate highly ($r=.89$).

³ One asterisk denotes 5 per cent. level of significance and two asterisks 1 per cent. level of significance (two-tail test of significance).

The correlations between size constancy and "Public-private dimension" score are positive, but insignificant. The correlations between Intra-individual variability of performance and "Public-private dimension" scores are negative, and the one for the distance 7.5 m. significant. However, as the latter was not predicted by the "Autism" hypothesis, it is difficult to interpret it. It was also found that the two dimensions "Abstract-concrete" and "Public-private (autistic)" are not orthogonal. The correlation between "Abstraction Level Combined" and "Autism Combined" scores $r=.42$. However the correlation between the McGaughran "Openness" of Concept scores and the McGaughran "Publicness" of Concept scores is almost zero, $r= -.03$. Thus there is a difference in orthogonality between McGaughran's dimensions and our dimensions and also while there is a high correlation between both "Public-private" dimensions, the correlation between both "Abstraction" dimensions is only .52. This may be due to the fact that two "Abstraction" dimensions differ in some important respect. A suggestion may be put forward that our dimension of "Abstraction" is much more related to verbal factors than McGaughran's dimension of "Abstraction". However the answer to this must await factorial analysis.* So there is more evidence in the results of this study supporting "Selectivity" hypothesis than the "Autism" hypothesis.

The last hypothesis to be treated is that paranoid schizophrenics show better size constancy and better preserved ability to form concepts than other schizophrenic patients.

There were 15 patients diagnosed as paranoid schizophrenics and 25 as other types of schizophrenic. Point biserial correlations were calculated between paranoid schizophrenia vs. size constancy and ability to form concepts measures.

* Factorial analysis of the material is being carried out at present and will be published in a subsequent paper.

Also the differences of the means were tested by the "t" tests between paranoid and other schizophrenics.

The following correlations and "t" values were obtained:

Size constancy distance 7.5 m.:

$$r \text{ p.b.i.} = .25 \text{ (} t = .194 \text{)}$$

Size constancy distance 15 m.:

$$r \text{ p.b.i.} = .28 \text{ (} t = .313 \text{)}$$

Intra-individual Variability in the performance in size constancy experiment—distance 7.5 m.:

$$r \text{ p.b.i.} = -.09 \text{ (} t = .193 \text{)}$$

Intra-individual Variability in the performance in size constancy experiment—distance 15 m.:

$$r \text{ p.b.i.} = -.23 \text{ (} t = .510 \text{)}$$

"Abstraction Level Combined" ("Abstract-concrete" dimension) scores:

$$r \text{ p.b.i.} = .37 \text{ (} t = .464 \text{)}$$

The McGaughran "Openness" of concepts score:

$$r \text{ p.b.i.} = .31 \text{ (} t = .636 \text{)}$$

These correlations and the differences are in the predicted direction, but they do not attain the significance level, thus leaving the hypothesis neither confirmed nor refuted.

In order to find out whether the variables investigated in this study are related to age and to the length of stay in the hospital, the age of the subjects and the length of their stay in the hospital was correlated with size constancy measurements, intra-individual variability of performance in size constancy experiment measurements, Combined Abstraction Level, McGaughran's "Openness" of Concepts, Letter Finding Test, and Gottschaldt's Figures. No correlation was significant and no trends were detected. However one has to bear in mind that our sample was relatively homogeneous as far as age and the length of hospitalization were concerned.

DISCUSSION

This study indicates that the abnormalities of thinking and perception in schizophrenic patients can be described as an inability to "attend selectively" or "to select relevant information". It has also been found that there may be a difference in this respect between paranoid schizophrenics and the other types of schizophrenics, with the latter being more affected than the former.

The inter-correlations of the performance scores of the subjects give more support to the "Selectivity" hypothesis than to the "Autism" hypothesis. However, these hypotheses are not mutually exclusive. The ability to conform to a social pattern presupposes some ability to "select" and to maintain a "set". The "Selectivity" hypothesis is more inclusive than the "Autism" hypothesis. The difference between the two theories lies in the stress they put on interpersonal relationships versus cognition. Most of the recent thinking about schizophrenia influenced by the psycho-analytical tradition has regarded the disorder of cognition as being secondary to that of motivation and interpersonal relations. One might argue that it is the other way round—that the emotional and interpersonal difficulties are caused by the disorders of perception and thinking. This position was taken by Bleuler (4) who regarded the "looseness" of association in the thinking of schizophrenic patients as primary to other disorders.

The authors feel that this may be a pseudo problem like the proverbial question, "Which came first—the chicken or the egg?" However the cognitive hypothesis of "Selectivity" is broader and more general than the "Autism" hypothesis. It deals with the subject's relationships to his total environment, both animate and inanimate.

It has been shown that in schizophrenic patients there is a definite relationship between constancy of perception and abstract thinking and also probable relationship between constancy of perception and the ability to break down *gestalts*. This finding, subsumed under the heading of "Selectivity" theory, can be related to the similar findings of other investigators in the field of perception. In his *Factorial Studies of Perception*, L. L. Thurstone (53) isolated among other factors: the factor "A" and the factor "E". The first factor represents the ability to "form perceptual closure against some distraction". The second factor is concerned with "the manipulation of the two configurations simultaneously or in succession". It denotes a freedom from what is called by Thurstone as "Gestaltbindung" and implies "flexibility in manipulating several more or less irrelevant or conflicting *gestalts*". This factor is related to the Reasoning (R) factor of intelligence. Both factor "A" and factor "E" are correlated with size constancy. The proposed factor of "Selectivity" may be related to Thurstone's factor "A" and factor "E".

The cognitive attitude of "Focusing vs. non-focusing" described by Schlesinger (48), which denotes the subject's ability to focus on the few relevant variables while excluding the influence of all others, is related to the factor of "Selectivity" put forward in this paper. Also Witkin's (62) finding is relevant here. This author has found that those subjects who perceive a position of their body or a position of a rod independently from the total perceptual field (or, to put it differently, who can perceive a part of a field independently of its surroundings) perform better on the Gottschaldt's figures. He also has found that children and schizophrenics are much more "field bound" than normal adults.* Salzinger's (43) finding that in schizophrenic patients weight judgment is more affected by "Anchoring Stimuli", than in normal controls is also relevant to our findings, as it indicates that in schizophrenic patients there is an impairment of the ability to "shut out" disturbing background stimuli.

It remains to formalize these relationships, subsumed under the heading of "Selectivity" theory, in the terms of general psychological theory. Thinking and perception cannot be separated; they are aspects of the same cognitive process. This cognitive process can be described to use Bartlett's terminology, as an "effort after meaning". In perception this "effort after meaning" is the "effort to attain object", an attempt to perceive the world in terms of stable objects—objects situated in definite places in space and having a continuity in time. This is true whether from the metaphysical point of view one regards "objects", "space", and "time", as Kantian innate categories of "pure reason" or whether one follows the tradition of the English empiricists and regards them as characteristics of external reality learned by experience.

In thinking, this "effort after meaning" is an effort to attain a concept or to classify information into certain categories. We tend to perceive not only stable things, but also look upon them as representatives of classes and categories of things. The process which appears to be involved in both thinking and perception is abstraction. Abstraction can be simply described as paying attention to certain characteristics and disregarding others; or in more general

* This was found in female schizophrenic patients, a small sample of paranoid schizophrenic male patients deviated in the opposite direction (62).

terms, abstraction can be described as selection of information—some information is used, other is suppressed.

How can the "selectivity" theory be applied to the problem of constancy of perception? If one takes as the point of departure some of the existing theories of constancy of perception, such as Brunswik's "Probabilistic Functionalism" (9), Ames's "Transactional Functionalism" (2), or Bruner and Postman's "Hypothesis Theory" (8), one finds that all these theories offer more or less the following explanation of the phenomenon of constancy. A pattern of stimulation could give rise to unlimited numbers of hypotheses regarding the other patterns of stimulation, which are linked up with it in a meaningful, causal matrix (matrix of cause and effect), but only certain hypotheses are selected. For instance, if certain patterns of stimulation (a retinal image) is interpreted as a small object at a short distance, an extension of an arm and touching this object will give rise to another pattern of stimulation. These two patterns will be linked up in a causal way; they will form a closely knit sequence of patterns of stimulation. On the other hand, if the same pattern of stimulation—the same retinal image in our case, is interpreted as a large object at a long distance, then the walking towards this object with the size of the retinal image constantly increasing will give rise to a different sequence of patterns of stimulation linked up causally. These two sequences of closely knit patterns are clearly delineated; they form two distinct classes of phenomena. In this respect they are like logical classes of objects, or concepts.

What is important in both cases is the ability to select consistently certain cues or features and to disregard others. A pattern of stimulation presents unlimited numbers of cues: "a", "b", "c" . . . "n". Only cue "a" is consistent with the hypothesis that this particular pattern of stimulation is a member of the sequence "A". If this hypothesis is chosen, cue "a" is selected and cues "b", "c" . . . "n" are disregarded. The same applies *mutatis mutandis* to cue "b" and hypothesis "B" and so on. The question why certain hypotheses about patterns of stimulation are selected and others rejected is a difficult one. If one knew the answer to this problem one would probably know the answer to most of the problems of human behaviour. There are various theories; some stress "probability of validation", others the "directive state of the organism" or "particular set induced by the task". However all the theories recognize the importance of set or "einstellung" which means that once a choice of hypothesis is made the subject selects certain cues consistently and rejects other cues until the hypothesis about the object is confirmed or refuted.

The same applies to concept formation or abstraction. An object has an unlimited number of characteristics: "a", "b", "c" . . . "n". If it is being classified with some other objects only one or few characteristics of this object are relevant. For instance only the characteristic "a" is relevant if it is classified with all objects belonging to class "A", only characteristic "b" is relevant if it is placed in class "B". Other characteristics are disregarded. So attending selectively and consistently to certain cues or features and disregarding others is important in both perception and thinking. This selectivity has to be consistent, therefore it is important that only one set at a time or only one hypothesis at a time is maintained. There are probably the same basic mechanisms behind the perception of stable objects due to constancy of perception and behind the formation of concepts due to abstract thinking. These mechanisms reduce the flux of experience to a certain number of constants or stable constructs from which the "knowledge" of the environment is built.* In terms of cybernetics,

* Von Uexkull calls this subjectively constructed environment the "Umwelt" (54).

these mechanisms can be described as filtering or selective letting through some information and stopping other information. It is suggested that these mechanisms of "selectivity" are affected in schizophrenia.

There is also another interesting possibility which offers itself in connection with the time aspect of perceptual process. The process of selectivity and hypotheses testing must have a certain time duration.* This development in time is quite obvious in thought process, but it is not so obvious in perception, which is usually regarded as being immediate. However the work of the Leipzig school with "Aktualgenese" (Sander (44), Krueger (30)) on perception and the more recent work of Kragh (29) indicate that perception is a process which develops in time. It develops in milliseconds from being global and undifferentiated to being precise and definite. Werner (59) showed that perception of small children, patients with brain injuries and schizophrenics is global, undifferentiated and "physiognomic". He assumed that in brain-injured patients and schizophrenics a regression takes place to childlike mode of perception. Thus it is very likely that in each act of perception the ontogenetic phases of perception are repeated and that in children, brain-injured patients and schizophrenics, perceptual development process stops at an earlier phase while in normal adults it progresses and elaborates the material further. If perception is not given in a point-like present, but each act of perception develops in time, it develops from a global undifferentiated percept to an analytical structured and differentiated percept, from a momentary configuration of visual stimuli to the percept of a definite object. In terms of Gestalt psychology each perceptual process involves breaking down immediately present gestalts and forming new gestalts. Thus a stimulus configuration forms a certain pattern or gestalt, a gestalt which is determined by such factors in figure-ground organization as "similarity", "proximity" and "good continuation" of the elements, described by the classical Gestalt psychology—factors which are given "here" and "now" and are independent of previous experience.† These primary gestalts have to be broken and the elements constituting them built into the percepts of an object in accordance with the hypothesis entertained at that moment by the perceiver. If these primary gestalts are very "strong", formation of percepts of objects may be well nigh impossible—the trick which is used in camouflage.

We have then much evidence that the perception of schizophrenics is more primitive, more global, less differentiated and structured, than that of normals. It appears that these patients have a greater difficulty in breaking "primary gestalts" and in forming percepts of objects, that their perception is more influenced by the "here" and "now" factors of the immediate situation and less by the experience of the past and the anticipation of the future. The perception of schizophrenics is more literal in the context of "here" and "now" and less oriented in the time continuum, than of normals. Their perception therefore is more in terms of the total momentary configurations of stimuli rather than in terms of objects having certain continuity in time with which it is possible to have certain "transactions". While in normals a selection takes

* In terms of cybernetics the object and the perceptual response to it form a "feed back" system with earlier percepts corrected and changed to fit the "set" of the organism. This process takes time. In sensory deprivation experiments this process of selection and elaboration is artificially limited by the paucity of information and the percept does not develop beyond the early phase.

† These factors can be found in "pure culture" in congenitally blind people who have their vision restored later on in life by surgical operation and in animals reared in darkness when they have been exposed for the first time to visual stimuli (Seden (49), Rieson (41), Hebb (23, 24)).

place from these total momentary configurations in terms of the hypotheses about the perceived objects. The same lack of differentiation, the same globality and "literalness" or concreteness (boundness to "here" and "now") characterize the thinking process of schizophrenic patients (syncretistic thinking). At the same time one has to bear in mind that "globality" of perception and thinking cannot always be equated with "primitiveness" and immaturity. It occurs in the experiences of mystics whose experiences are holistic and global.

It is tempting to translate these ideas into neurophysiological terms and speculate on the nature of the disturbance in schizophrenics responsible for their inability to select relevant information which is used in attaining cognitive constructs and therefore in structuring a meaningful environment. There is some evidence that the reticular-activating system, or a similar system, which conditions or prepares the cortex for the reception of certain specific stimuli may play an important role in this process. As a speculation one may suggest that in certain types of schizophrenia, particularly in the acute phase of this illness, and also in L.S.D. and mescaline-induced psychosis, the reticular activating system is over-active; anyway, there is some change in filtering the stimulation. The gates are wide open, the cortex is flooded with irrelevant information, maintenance of set becomes difficult. The subject cannot attend selectively to certain cues and he interprets all the stimulations patterns literally because he attends to all the cues at the same time.* He also thinks concretely because he attends to all the features of the object at the same time. This is in agreement with Rodnick and Shakow's (42) finding that schizophrenics are not capable to maintain a set when they perform a task. There are also some investigators who stressed the importance of the level of non-specific excitation of the brain for the selectivity in perception and motor behaviour. Thus Hebb (25) postulated an inverse "U" function for the relationship between the general excitation as mediated by the "reticular-activating" system and the efficiency of functioning of the "cell-assemblies" and "phase sequences" responsible for patterning of perception and motor behaviour. A certain level of general excitation is necessary to activate the "cell assemblies", however when the level of excitation is increased beyond certain limits, all the "cell-assemblies" reach the threshold of firing. There is the same probability for all of them to be fired and as a result the behaviour becomes disorganized. Hull's general equation $E_r = f(H \times D)$ predicts the same (26). If "Drive" attains a certain magnitude of strength even the "weakest" habits reach the activation threshold, the hierarchy of the habits disappear, and the behaviour becomes disorganized. The Yerkes-Dodson law of the effect of the strength of motivation on the performance in learning has the same implications.

In other cases of schizophrenia where the mechanism responsible for selection of cues is not deranged, but the mechanism responsible for validating "hypotheses" is deranged, the subject will form hypotheses about the universe, but his hypotheses may be false because the validating mechanism, probably operating on the basis of theory of probability is at fault. One can very well imagine that certain paranoid schizophrenics with their rigid well-systematized delusions would fall into this category. In these patients abstract thinking and constancy of perception may be well preserved, but they lead to wrong conclusions. The picture presented in this paper is an over-simplification of a very complicated entity, which is schizophrenia. However it may serve as a scientific model in the psychological approach to the problem till a better one is found.

* Bruner in a recent paper has stressed the importance of the principle of selectivity in the neural mechanisms of perception (6).

SUMMARY

1. The relationship between Size Constancy and Concept Formation in schizophrenic patients has been investigated.
2. A technique has been developed for measuring "Abstractness vs. Concreteness" of concepts and "Publicness vs. Privatness (Autism) of concepts".
3. It was found that there is a positive correlation between poor size constancy and impaired ability for abstract thinking in schizophrenic patients.
4. It was found that both size constancy and abstract thinking are related to the ability to "break down" gestalts.
5. A cognitive theory—"Selectivity" theory—has been proposed as an explanation of these relationships.
6. The theoretical implications of the "Selectivity" theory have been discussed.

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STRESS REACTIVITY IN RELATION TO DELINQUENT AND PSYCHOPATHIC BEHAVIOUR

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INTRODUCTION

ANXIETY, either manifest or in the form of non-specific emotional disturbance, has been widely accepted as an operative factor in the personality structure of delinquent subjects (Aichhorn, 1; Burt, 5; Friedlander, 17; Stott, 53), and at present it appears that cognitive factors have little or no bearing upon the problem (Marcus, 43; Woodward, 61). By regarding anxiety or activated stress as a stimulus producing response (Hull, 24, 25; Miller, 45), delinquent behaviour has been postulated as learned responsiveness to anxiety or stress, which also functions as a learnable drive (Tong, 55). Previous investigations using Rorschach, persistence and galvanic skin response indices of anxiety or emotional disturbance have shown that there are significant variations according to both the nature of the conduct disorder (sex, violence, larceny, etc.), and ratings of stability (Tong, 54, 55). Different forms of conduct disorder are also known to carry different relapse potentialities, so that sex offenders, for example, are less likely to relapse than are larceny offenders (Mannheim and Wilkins, 42; Tong and Mackay, 60), although it is possible that different methods of treatment or disposal influence the likelihood of relapse for different sex offenders (Radzinowicz, 48). Prediction tables have been constructed for the purpose of more accurately assessing the most unstable offenders (42), and although such systems carry an encouraging degree of reliability it is apparent that greater reliability in prediction will only follow more accurate personality assessment than is possible by the use of impressionistic methods alone (58). Only knowledge of the relevant personality variables will lead to accurate assessment of change in subjects for whom the significant historical factors necessarily remain fixed. Furthermore, assessment techniques must be relatively unaffected by intelligence, education and rapport factors.

The present report is based upon the assumption that anxiety, or stress reactivity, is an important factor in delinquent instability. The *absence* of manifest anxiety has been observed to characterize the psychopathic offender, although little systematized research has been reported (McCord and McCord, 46). The purpose of this current report is to determine more closely the role of a stress reactivity factor in the structure of the delinquent and psychopathic subjects. Some of the following data are abstracted from a more detailed report (56). Relatively few studies have investigated the inter-relationship of reactions to different stressors, and most theoretical work on the psychology of the subject is based upon evidence derived from studies of normal, or at least intellectually average, people. For these reasons the data are treated firstly in terms of inter-relationships in order to determine certain theoretical issues concerning stress reactions, and secondly in relation to institution and social behaviour. The final analyses concern the problem of the relationship of early trauma to stress reactivity.

SUBJECTS

In all some 300 subjects were examined with one or more of the different techniques. The Normals (hospital staff), are not to be regarded as "controls", but were used simply to provide limited comparative data for the purpose of investigating certain issues. The patients are, or were at the time of examination, all certified male patients detained in a State Institution for mental defectives of "dangerous or violent propensities", and all had demonstrated some sort of serious misbehaviour. The age range of the patients is from 14 to 50 years with the majority being in their early twenties; the I.Q. range is from 60 to 120, with the majority being between 75 and 85 I.Q. Many, or most, of these patients could fit a legal definition of the psychopath. Care was taken to exclude from the analyses the data provided by any patient who might possibly suffer from a psychotic condition or show symptoms of intracranial organic pathology.

The various analyses given below show different values for N. This is due to the impracticability of examining every patient with every technique and to occasional failures in the recording devices.

TECHNIQUES AND INDICES

Four separate groups of indices were applied, as follows:

1. Overt response to a specific stressor. The apparatus was a standard Hardy-Wolff type dolorimeter designed to assess the subjective point at which heat intensity to an area of the skin changes from being rather pleasantly warm to being perceived as slightly noxious. This perceptual or attitudinal point is, in fact, well below the reaction or withdrawal point, and the whole testing procedure was designed to be as unrestrictive as possible with the extent of stimulation wholly dependent upon the patient's answers to questions at each point on the stimulus intensity scale. The index applied is termed VRP (verbal report of pain), following the suggestions of Hall, etc. (see below), and is measured in volts to the stimulus source—a 500-watt lamp. Corrections were made for mains supply fluctuations, and the range used was from 80 to 160 volts. The lower point is below normal *warmth* threshold and a good proportion of subjects are unreactive at the upper point. The stimulus was applied to the forehead commencing at 80 volts intensity and rising in 4-volt stages to the VRP point or to the arbitrary ceiling of 160 volts, whichever was reached first. Stimulation was for 7 seconds at each successive intensity with a 13-second break. Relevant research reports on this subject include Hemphill, Hall and Crookes (23), Hall (19, 20), Hall and Stride (21), Hardy, Wolff and Goodell (22), Clark and Bindra (6), Stengel, Oldham and Ehrenberg (52), Elithorn, Piercy and Crosskey (8).

2. Autonomic response to a specific stressor. For this the index was the extent to which the galvanic skin response (GSR), could be conditioned to an innocuous auditory stimulus. The subject was seated with eyes closed and the palmar electrodes of the GSR apparatus attached. After a good period of adjustment stimulation was applied every 15 seconds and consisted of *either* a brush on the closed eyelid with a piece of cotton wool simultaneous with an auditory click, *or* the auditory click alone, in a standard order. For each subject it was earlier determined that the auditory click was within his hearing range and did not produce a perceptible galvanic skin reflex. The series provides for 26 stimulations permitting a maximum of 15 unconditioned responses (to the eyelid brush plus the click), and 11 conditioned responses (to the click alone). Graphic records were obtained by means of a sparking galvanometer needle on teledeltos, sensitive paper. The technique has been reported in detail elsewhere

(57), and particularly relevant research reports on conditioned stressor responses include Franks (15, 16), Sampson and Bindra (50), Piercy, Elithorn, Pratt and Crosskey (47), Lykken (40).

3. Overt response to a generalized stressor. For this a frustration task was devised in order to assess the extent of regression, position stereotypy, and position fixation during mild frustration, and the effect of this upon subsequent learning. The subject is faced with two Morse keys mounted in front of a display panel containing a red bulb and a green bulb. The red bulb flashes momentarily every five seconds and is a signal for the subject to press one of the two keys. Pressing the correct key lights the green bulb (reward), and pressing the wrong key sounds a buzzer, for two seconds. The first three learning tasks are soluble, the fourth insoluble, and the final one also soluble. For Task I to obtain the reward light each time a key is pressed the subject must follow the temporal series Left Key, Right Key, L, R . . . For Task II the solution is L, L, R, R . . . For Task III the solution is L, R, R, L, R, R . . . For Task V the solution is R, L, L, R, L, L . . . During the attempts to solve Task IV (the insoluble task), the reward light and the buzzer occurred in random order (a total of 50 per cent. of each), for five minutes, i.e. 60 responses. All were reassured afterwards and informed that their attempts were very good. During this insoluble task period any five or more successive responses which constituted one of the earlier learned sequences was treated as regression, the Regression Score being the sum of these responses. Similarly, during the insoluble task period four or more successive responses were regarded as evidence of position stereotypy, the Stereotypy Score being the sum of these. The Learning Score for each of the four soluble tasks consisted of the number of responses made up to, and including, the first rewarded response for the criterion "eight successive rewarded responses". All responses, signals, reward lights and buzzer, were recorded on a polygraph. Relevant reports dealing with frustration research include Maier (41), Marquart (44), Jones (28), Russell and Steinberg (49), Knopfmacher (31, 32), Farber (14).

4. Autonomic response to a generalized stressor. For this the skin temperature was taken at intervals throughout the frustration task. The apparatus is a standard commercial electrical thermometer measuring to 0.1°C . by means of a surface probe placed on the back of the wrist of the resting hand under a loose rubber band. (For one of the studies reported below, the forehead temperature was measured.) Relevant research reports, most of which refer to the problem of variability in temperature reaction—decrease and increase—include Hall (20), Baker and Csapo (3), Baker and Taylor (4), Jacobsen, Kehlet, Larsen, Skinhoj and Munkvad (27).

Psychophysiological research into the inter-relationship of autonomic stressor reactions indicates that eventually indices should include measures of both inter- and intra-subject variability, and it is possible that a mathematical solution can be found. However, such a solution will be useful only when the topic has been explored with a wide variety of subjects. Relevant reports include Altschule (2), and those by Lacey and associated workers (33, 34, 35, 36, 37, 38, 39).

REACTIONS TO STRESSORS

VRP and Resting Temperature

A preliminary investigation to determine the reliability of the response to the specific stressor (VRP) and the accuracy of the modified apparatus concerned the derivation of the correlation co-efficient for the VRP and the

resting temperature of the skin near to the point of stimulation. It has been suggested (22), that the relationship between skin temperature and VRP is characterized by a straight line passing through zero stimulus at a skin temperature of $44.8^{\circ}\text{C}.$, and that the skin being tested must be raised to this temperature before stimulation becomes noxious, regardless of the initial level of skin temperature. However, it has been found (20), that there is a high negative correlation between the resting temperature of the skin and VRP for male and female neurotics. For the current study the skin temperature of the forehead was taken immediately prior to determination of the VRP. The temperature recorded was that maintained steadily for three minutes. The range for 17 male Normals was $31.6\text{--}35.7^{\circ}\text{C}.$, mean 34.04 , s.d. 1.00 , and the range for 35 male Patients was $29.5\text{--}34.8^{\circ}\text{C}.$, mean 32.92 , s.d. 1.00 . The range for the VRP score was 100–150 volts for the male Normals, and 82 to unreactivity at 160 volts for the male Patients. The product moment correlation coefficients for VRP and resting forehead temperature are -0.87 for the Normals and -0.41 for the Patients. The calculated regression equation is:

$$\text{Resting temperature} = 42.48 - (0.068 \times \text{VRP})$$

All Normals gave VRP scores which lie within three standard errors of the regression line, but 13 of the 35 patients gave results which deviated beyond three standard errors. All but one of these 13 patients reported prick perception long before what would be expected on physiological (i.e. skin temperature) grounds.

These results are in conformity with the earlier evidence concerning the high relationship between resting temperature and VRP (20), but also indicate that there is a certain amount of unreliability in the verbal responses of the Patients. This unreliability, showing itself mainly as over-excitation to a noxious stimulus, is important in the interpretation of the results given below, although it is equally important to note that over-inhibition (i.e. unresponsiveness), occurs for Patients but not for Normals, an observation also made in respect of neurotics, depressives, etc. (19, 20, 21, 23). A subsequent analysis of age and Wechsler I.Q. in respect of the VRP score for 100 male patients shows that although the age and I.Q. effects are insignificant, there is a slight tendency for the perception point to be later for those subjects over 30 years of age and also for those over 70 I.Q. There is no indication whatsoever of unreactivity being a function of, or associated with, very low intelligence; if anything the low I.Q. subjects demonstrated over-excitation.

VRP and GSR Conditioning

It seems reasonable to regard the VRP score as the subject's learned attitudinal overt response to a specific stressor, and the next problem concerns the relationship of this overt response with learning or conditioning to a specific stressor at the covert autonomic level, which would be in theory, the establishment of the intervening stimulus producing response. For 100 male patients both the VRP scores and resting forehead temperatures were taken simultaneously, and the GSR conditioning score determined about 30 minutes later. The results are as follows:

p = VRP; mean 126.2 , s.d. 23.4 , range 80–160 volts.

c = conditioning score; mean 4.9 , s.d. 2.9 , range 0–11 CR's.

t = resting forehead temperature; mean 34.0 , s.d. 1.28 , range $30.0\text{--}36.0^{\circ}\text{C}.$

The product moment correlation co-efficients are as follows:

$$r_{pc} = -0.41 \text{ (significant, } p=0.001).$$
$$r_{tc} = -0.04 \text{ (not significant).}$$

These co-efficients indicate a high negative relationship between the prick perception point and GSR conditioning, i.e. early verbal responsiveness corresponds with a high autonomic conditioning score, and *vice versa*. If the resting skin temperature is taken as the index of what the perception point *should* be (as would be the case for Normals), then there is no relationship between this index and the conditioning score.

In this particular study, two further points emerged. Firstly, there is a high positive correlation between the number of conditioned responses and the number of unconditioned responses ($r=+0.62$), and secondly the technique induces a degree of temporary drowsiness in some patients. This "sleep effect" was examined in relationship with conditioning score and VRP but was found to be unassociated with either index. It was thought possible that a relationship might have become apparent in view of the Pavlovian interpretation of sleep in terms of irradiation of inhibition.

Effect of Frustration on Skin Temperature

The Frustration Task records of 120 consecutive male Patients and 20 Normals were examined to determine the effects of the task upon an autonomic index of stress activation—the change in the surface temperature of the forearm. All of the Normals successfully learned the three preliminary soluble problems of the Frustration Task and so underwent the trial with the insoluble problem. Only 70 of the Patients solved the soluble problems and subsequently underwent the insoluble task, and these 70 form the Frustration Group. Following initial stabilization six temperature readings were taken for each subject, as follows:

- Temperature reading 1

Temperature reading 2

Temperature reading 3

Temperature reading 4

Temperature reading 5

Temperature reading 6
- —

—

—

—

—
- before Learning Task I

before Learning Task II

before Learning Task III

before the Insoluble Task

before Learning Task V

after Learning Task V

The mean temperature readings for Patients and Normals are given in Table I, from which it will be seen that the effect of learning Tasks I, II, and III

TABLE I

Forearm Temperatures of Patients and Normals during the Frustration Task

Temperature °C.

Temperature Reading					Normals (N=20)		Patients (N=70)	
					Mean	S.D.	Mean	S.D.
1	..	..	..	..	29.98	1.50	29.53	2.05
2	..	..	..	..	30.22	0.95	29.61	2.09
3	..	..	..	..	30.29	1.14	29.62	1.99
4	..	..	..	..	30.32	1.00	29.63	2.23
5	..	..	..	..	30.21	1.58	29.58	2.50
6	..	..	..	..	30.35	1.30	29.54	2.34

is to bring about a steady increase in skin temperature, but the effect of the frustration period is to bring about a fall in the mean but an increase in the

size of the standard deviation. These observations hold good for both groups but whereas the mean temperature of the Normals rises rapidly during the final, soluble task, that of the Patients continues to fall. Care should be taken not to interpret this difference beyond the immediate data in view of the fact that the experiment was not designed to examine such differences, and consequently did not control age, I.Q. and other factors. The data are expressed graphically in Figure 1.

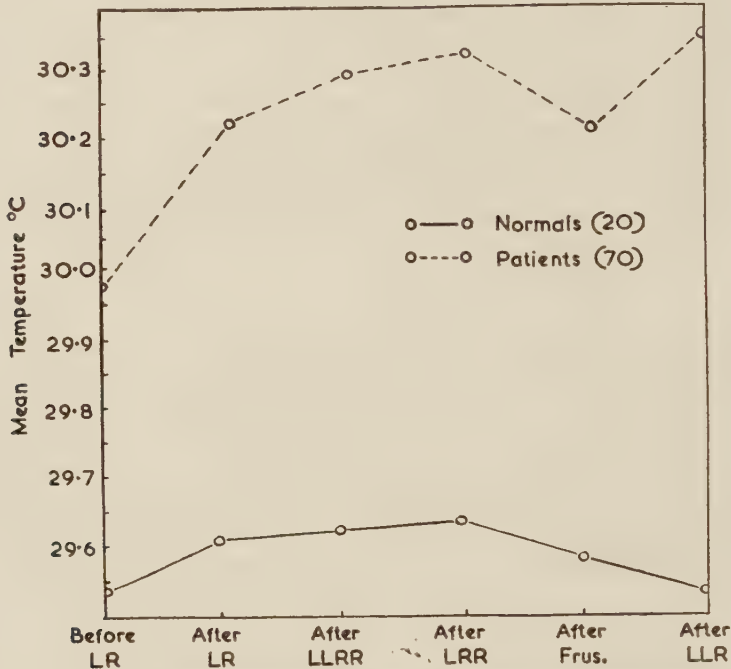


FIG. 1.—Variations in mean skin temperature during the Frustration Task.

The temperature readings indicate two things concerning the Patients. Firstly, the frustration period induces a physiological stress reaction in the form of a temperature decrease and secondly, this particular stress reaction (temperature fall), is not shown by all the subjects. This second point is central to the subsequent studies.

During the learning of Tasks II and III (Temperature reading 4 minus T.R. 2), 19 Patients demonstrated a rise in temperature, 27 no change, and 24 a fall in temperature. During Frustration (T.R. 5 minus T.R. 4), 22 demonstrated a rise, 8 no change, and 40 a fall. Ignoring the direction of change, it is clear that the surface temperature is greatly affected by the 5 minutes frustration, and justifies the usage of the Frustration Task as a stressor. This is indicated by the following table, for which the value of χ^2 is 13.85, $P=0.001$.

				Temperature Reactivity	
				During Learning	During Frustration
Change in temperature $<0.1^{\circ}$ C.	..	..	..	35	14
Change in temperature $>0.1^{\circ}$ C.	..	..	..	35	56

Much psycho-physiological work is complicated by the fact that the experimentally produced index of change is found to be a function of the basal autonomic level. For skin temperature change under frustration not only might the magnitude of the change be associated with the pre-frustration level, but also the direction of change, i.e. rise or fall, might be similarly tied. The problem of magnitude is better approached by taking each group separately, i.e. those patients who show a rise in temperature ($>0.1^{\circ}\text{C.}$), under the stressor and those who show a fall ($<0.1^{\circ}\text{C.}$). For the increase group there is no apparent relationship between the magnitude of change and the temperature immediately prior to frustration ($N=22$, $r=-0.01$). For the decrease group there is a suggestion of a slight positive relationship although the co-efficient fails to reach significance ($N=40$, $r=0.2$).

The following table gives the data for the *direction* of temperature change during the frustration period relative to the basal temperature, i.e. T.R. 4, immediately prior to the Insoluble Task.

Change in Temperature				
		Fall $>0.1^{\circ}\text{C.}$	Zero	Rise $>0.1^{\circ}\text{C.}$
Basal temperature	$<27.6^{\circ}\text{C.}$	10	3	1
Basal temperature	$27.6-31.0$	25	7	9
Basal temperature	$>31.0^{\circ}\text{C.}$	1	4	10

These figures indicate that if the pre-frustration temperature is below 27.6°C. and a change of any magnitude occurs under frustration, the change will take the form of a decrease; if the basal temperature lies between 27.6 and 31.0°C. the ratio of decrease to increase is about 3:1; if the basal level is above 31.0°C. and a change occurs it will take the form of an increase. Restriction of the analysis to the 22 subjects of basal temperatures of below 27.6 and above 31.0°C. who demonstrated a change of any magnitude, the value of χ^2 is 14.43, significant at the 0.001 level of P. From these figures we can conclude that zero change in temperature is not associated with basal level, but rise or fall reflects a process already in operation before the experimental period of stress.

To this point we have considered only those Patients who were able to learn the pre-frustration learning tasks. For those Patients unable to learn Task III but who learned Tasks I and II ($N=19$), the temperature curve was similar to that of the Frustration Group in that there was an initial slight rise but failure to solve Task III brought about a fall in the size of the mean and an increase in the size of the standard deviation. The data for these 19 subjects are as follows:

Temperature reading 1 (before Task I)	—	mean 30.3°C. , s.d. 2.1
Temperature reading 2 (after Task I)	—	mean 30.4°C. , s.d. 2.03
Temperature reading 3 (after Task II)	—	mean 30.5°C. , s.d. 1.99
Temperature reading 4 (after Task III)	—	mean 30.4°C. , s.d. 2.05

It will be observed that the mean temperature of these Patients is nearly 1°C. higher than the temperature of the Frustration Group over the entire series, a factor possibly associated with the learning or motivational lack of this group. More anxious subjects would obviously be motivated to do better providing the anxiety level was below that necessary to produce disruption. For the other 24 subjects who failed the first or second of the learning tasks

the initial resting temperature is comparable with that of the Frustration Group, i.e. 29·36, s.d. 2·17, and in this case probably indicates an anxiety level sufficient to produce disruption in performance.

Frustration and Learning

Maier (41), emphasizes that an important effect of frustration for an experimental group of rats is the distribution of the post-frustration learning scores. If frustration has been effective then these learning scores will be bi-modally distributed and indicative of position fixation in those animals who do not demonstrate normal patterns of learning. A bi-modal distribution of post-frustration learning scores has been found for human subjects following insoluble problem conditions of 75 per cent. non-reward, but a unimodal distribution with similar subjects under conditions of 25 per cent. non-reward or less (44). However, another study with human subjects did not result in a bi-modal distribution of post-frustration learning scores (28), but did determine a positive relationship between the length of frustration and subsequent learning. Post-frustration learning scores could, therefore, be useful indices of patients' reactivity to frustration stressors, or the disruption effect of frustration.

The present section concerns 114 Patients and 23 Normals who underwent the full Frustration Task. Ten Patients and two Normals failed to solve the post-frustration problem—roughly similar proportions, The learning scores for the four soluble tasks are given in Table II, and it will be seen that the means for

TABLE II
Learning Scores of Patients and Normals during the Complete Frustration Task
Learning Scores

Learning Task				Normals			Patients		
			N	Mean	Variance		N	Mean	Variance
I	23	3·96	3·35	114	5·80	42·72			
II	23	6·22	24·76	114	11·05	93·30			
III	23	7·87	35·89	114	16·60	160·29			
IV (insoluble)	23	—	—	114	—	—			
V (a)	21	11·33	51·40	104	12·59	70·57			
V (b)	23	15·57	235·0	114	16·75	244·2			

the post-frustration problem are calculated twice (Va and Vb, in the table); the first figure excludes the non-learners from the calculation and the second includes these subjects with arbitrary scores of 60. From Table II it will be seen that the Normals were consistently speedier at learning the soluble problems than were the Patients, as would be expected, but whereas the Normals demonstrated a marked retardation in learning following frustration, the Patients demonstrated an improvement. These differences between the two groups, similar to those noted above in respect of temperature changes, indicate the inadvisability of extending theory based upon data derived from Normal subjects to explain the behaviour of abnormal people, and *vice versa*. Nevertheless, for Patients the figures show some indication of bimodality in post-frustration learning scores, in that 10 subjects were unable to learn the final task, but on the other hand, these could reflect a simple biological survival curve.

Frustration-Induced Regression, Post-frustration Learning and Temperature Reactions

During the attempts to solve the insoluble task, all subjects applied one or more of the previously learned response series on at least one occasion. Inspection of the polygraph records made it clear that two different phenomena were involved, depending upon the degree to which the subject regressed, i.e. the number of regressive responses. Occasional re-application of one of the earlier learned habits probably constitutes nothing more than chance behaviour or a measurement artifact, but continuous demonstration of an earlier learned habit in the face of intermittent non-reward (buzzer), is obviously a behavioural phenomenon analogous to certain social behaviour. It will be seen from Figure 2 that high regression scores are shown more frequently by Patients than Normals, and the question arises concerning the *nature* of this regressive behaviour. Does high degree regression constitute a simple stress reaction of no motivational significance except possibly continuation of activity, or is this behaviour stress reducing, or does it appear in lieu of stress and is therefore stress inhibiting?

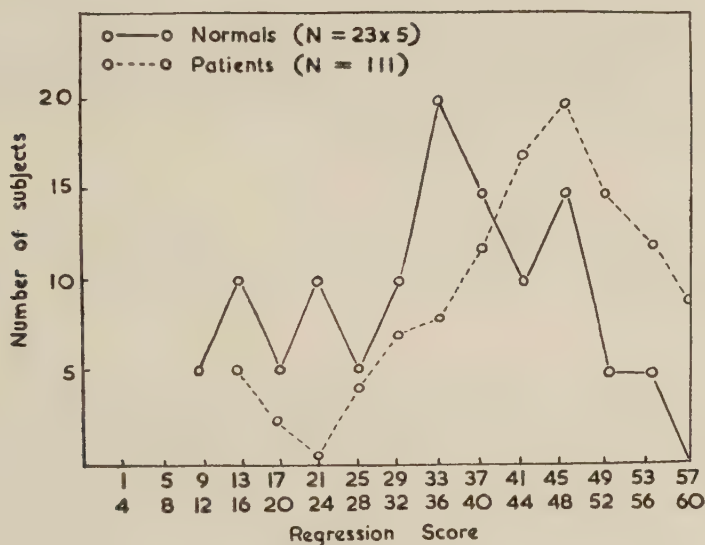


FIG. 2.—Distribution of Regression Scores for Patients and Normals.

We noted above that the temperature reaction to frustration can be regarded as evidence of stress activation or otherwise, depending upon whether it is a decrease or an increase, and similarly at the overt level, the post-frustration learning score should indicate the degree of disruption occasioned by the frustration stressor. In a study of 62 Patients it was found that those subjects showing a temperature decrease of more than 0.1°C. during frustration gave a mean regression score of 39.14 , variance 157 , $N=34$, whilst those showing zero temperature change or a temperature increase gave a mean regression score of 45.64 , variance 91 , $N=28$. (Variance ratio $=1.714$, $P=0.05$.) The mean post-frustration learning score of the temperature decrease subjects was higher than that of the zero change or increase subjects, although the variance ratio was not significant, and an analysis of the regression scores

and the post-frustration learning scores also indicated no significant association between these two indices.

One can conclude that high degree regression tends to occur in the absence of activated stress (temperature fall), and on no occasion was the temperature found to fluctuate as would be the case if regression were stress *reducing* in nature. This latter hypothesis would require the temperature to fall at first as a stress response and then to return to the previous level as stress was reduced by regression. The indications are, therefore, that regression, at least in this specific situation, is stress inhibiting, or at least appears in lieu of the autonomic stress reaction.

Frustration Task Reactions, VRP and Conditioning

The previous data have established two sets of information, (a) there is a high association between the autonomic and overt responses of the "specific stressor" situations, and (b) there is an association between autonomic and overt reactions to the "generalized stressor" situation. The current problem concerns the relationship between these two sets of stress reactions.

It is noted above that not all subjects were able to learn the three soluble pre-frustration learning problems. Non-learners were found to have a slightly lower conditioning score than were those able to learn the soluble tasks, but the difference was not significant. However, marked differences were apparent in respect of the VRP score for Learners and Non-Learners, as is shown by the following table ($\chi^2=8.82$, $P=0.01$).

					VRP—Volts	
					100–149	<100 or >149
Non-learners group	..	..	..	..	27	24
Learners group	..	..	..	..	68	23

The difference is mainly centred upon the low end of the VRP scale, and in fact 22 per cent. of the Non-learners gave VRP scores below 95 volts, compared with 3 per cent. of the Learners group. The differences at the other end of the VRP scale are not quite so marked. It is obvious, therefore, that any application of the Frustration Task scores excludes those of subjects who are highly reactive to specific trauma. These subjects do not learn the necessary introductory habits. It is likely that a common attitudinal or motivational factor accounts for the fact that subjects who are highly reactive to specific trauma also demonstrate learning inability.

The remaining data of this section concern subjects able to learn the pre-frustration problems and who subsequently underwent the period of frustration. The following table indicates that those showing a fairly high conditioning score were very unlikely to show a temperature increase during frustration ($\chi^2=6.43$, $P=0.01$).

					Conditioning Score—CR's	
					<6	>5
Frustration temperature change—fall	..	..	..	..	23	16
Frustration temperature change—zero/rise	..	..	..	..	15	1

Similar results were apparent in a comparison of VRP scores and temperature change although the coefficient of association was less.

Comparisons of specific trauma indices (conditioning and VRP), with the overt behavioural indices of the Frustration Task failed to yield significant correlation coefficients. The trends indicated that for Low Conditioners (CR's<6), the mean regression score is higher, but there is no apparent difference for the post-frustration learning score.

Position Stereotypy

Repetition of the same response in spite of its non-rewarding nature and in view of its futility, has come to be the hallmark of frustration research (14, 31, 32, 41, 44, 49, 28), and it has been suggested (41), that the phenomenon is analogous to certain behaviour disorders. For this reason the subject of stereotypy is treated separately. Virtually all earlier studies concern either rats or university students, and in the current study it immediately became apparent that the Patients differed considerably from Normals in the extent to which they displayed position stereotypy. However, contrary to expectation, the Patients demonstrated *less* stereotypy under frustration than did Normals, as is shown in Figure 3. The difference is even more pronounced if the four female Normals are excluded, as none of these girls demonstrated position stereotypy to any great extent. The possibility that stereotypy is a function of I.Q., which would account for the difference between Patients and Normals, is examined later.

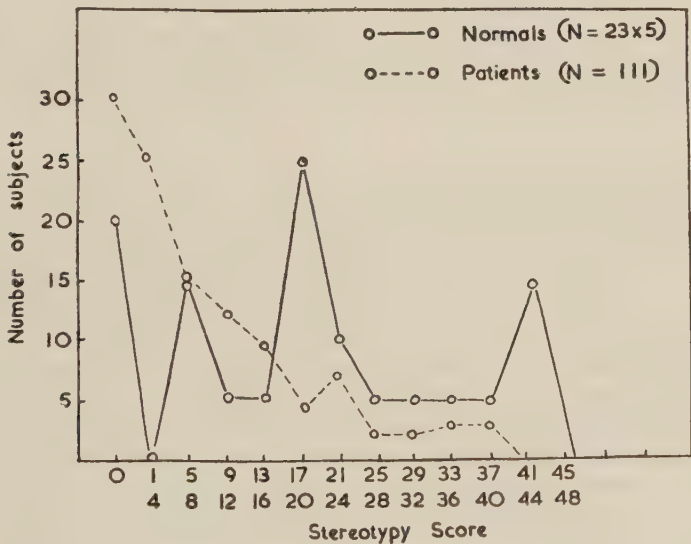


FIG. 3.—Distribution of Stereotypy Scores for Patients and Normals.

Analysis of the stereotypy scores of Patients indicated two important features concerning stereotypy. In the first place the phenomenon only occurred to any great extent in the presence of the autonomic stress reaction of temperature decrease during frustration. This is shown by the following table ($\chi^2=7.01$, $P=0.01$).

					Frustration Temperature Change	
					Decrease	Zero or Increase
Stereotypy score <17	..	..	..	..	27	25
Stereotypy score <16	..	..	..	..	12	1

Position stereotypy is therefore an activated stress reaction, but we can make no substantiated comment as to whether it is stress reducing in nature, beyond noting that fluctuation in the temperature reading did not occur, i.e. immediate fall followed by a rise. Position stereotypy would therefore appear to be of a different logical, or psychological order from regression which occurs in lieu of the autonomic stress reaction (see above). The following table indicates the negative correlation which exists for position stereotypy and regression in accordance with the stress activation observations ($\chi^2=8.45$, $P=0.01$).

					Regression Score	
					<36	>35
Stereotypy score <17	..	..	..	..	16	74
Stereotypy score <16	..	..	..	..	10	11

There is no apparent relationship between the stereotypy score and the post-frustration learning score, contrary to Maier's theory (41). There is a slight trend relating high conditionability and low VRP score to higher position stereotypy scores.

Frustration Reactions and I.Q.

Various analyses concerning the relationship of regression, position stereotypy and learning with Wechsler I.Q. have given no indication that such a relationship exists.

Comments on Stress Reactivity

Certain of the observations are of particular interest. These are: (a) the high correlation between VRP score and surface temperature for Normals compared with the relatively low correlation for Patients, (b) the high correlation between VRP score and conditioning score which indicates an association between autonomic and overt responsiveness to specific stressors, (c) the indication that temperature fall occurs for only some subjects during frustration and that this reaction is slightly more pronounced but of shorter duration for Normals than for Patients, (d) evidence that temperature decrease during frustration is associated with lower regression but high position stereotypy scores, and *vice versa*, (e) the observation that subjects who are highly reactive to specific stressors almost invariably show temperature decrease under frustration, but other subjects who are not highly reactive to specific stressors may or may not show evidence of autonomic stress activation.

These features are relevant to the work emanating from three different theoretical sources. The range of reactivity which varies from high degree excitation to high degree inhibition is of direct relevance to, and in conformity with, Eysenck's dimensional theory. This is particularly so with regard to the interpretation of the introversion/extraversion dimension in terms of varying excitatory/inhibitory balance (11, 12, 13), and the validity of conditioning data in this respect (15, 16). The data are also related to the Pavlovian concepts of

variation in inhibitory activity although these concepts have not been formalized by the Russian theorists (26). For frustration theory (41), several points are important. Firstly, the effect of experimental frustration on the autonomic state of the individual varies so that only a proportion of subjects demonstrate evidence of physiological fear or anxiety. Secondly, regression and position stereotypy would appear to be behaviour forms of different psychological order and should not be equated. Thirdly, and of practical importance, the behaviour of Normals is different from that of the nosological group in a different manner from that expected.

Considerable stress reactivity research is concerned with the problems of response specificity and variability between autonomic indices (33-39). The correlations of the current study do indicate considerable inter-response and inter-stressor agreement for subjects highly reactive to stressors but relatively little for others. Highly reactive subjects would probably never be encountered in the research studies concerning normals or highly selected military personnel.

STRESS REACTIVITY AND CONDUCT DISORDER

Hospital Stability

The foregoing data indicate that the autonomic reactivity of Patients to stressors varies from extremely poor reactivity, for some of the men, to extremely high reactivity for others, with a moderate group falling in between the two extremes. According to theoretical interpretation of this variation we can put forward hypotheses for the overt social behaviour, firstly, within the hospital. There is some evidence to indicate that conduct disorder within hospital is associated with poor prognosis (60).

The following hypothesis contains the assumption that a stable person, or one who responds to therapy or social training, is moderately reactive to the stressors and frustrations of everyday life. The stable person accepts them and learns from them, but the unstable person avoids them *or* is highly reactive and hence disrupted.

Hypothesis. Patients showing stable behaviour in the hospital will be those showing laboratory evidence of overt behavioural or autonomic reactivity to mild stressors. Unstable patients will demonstrate high degree stress inhibition, or virtually no inhibition of the intervening stress response.

Stability Ratings. Three senior male nurses independently rated the ward behaviour of 200 patients as either Stable (S), Unstable (U), or Not Known (NK). Laboratory records of 19 of these patients were discarded owing to suspected psychotic or organic disorder. From the ratings patients were classified into a Stable group and an Unstable group. The Stable group consisted of those men rated Stable by at least two of the assessors, and whose ratings would therefore be SSS, SSU or SSNK. The Unstable group consisted of those men rated Unstable by at least two of the assessors, i.e. UUU, UUS, UUNK. Patients not falling into either of these categories were excluded from the subsequent analysis.

Results. There was found to be a slight tendency for the Stable group to contain relatively more patients able to learn the soluble problems of the frustration task, than the Unstable group, but the coefficient of contingency is insignificant. The subsequent frustration task data concern only those subjects able to learn the pre-frustration soluble learning tasks. We have noted above that patients who are highly reactive to specific trauma do not learn these

preliminary series, so that highly stress reactive unstable subjects are necessarily excluded from the frustration figures. From the hypothesis, therefore, and bearing in mind the exclusion of highly stress reactive subjects, from the frustration data, it would be expected that Stable subjects would show a temperature fall during frustration. This expectation is upheld by the following table ($\chi^2=5.32$, $P=0.05$).

						Frustration Temperature Change	
						Decrease	Zero or Increase
Stable group	..	..	..	..	..	17	12
Unstable group	..	..	..	..	..	4	13

It would also be expected that Stable patients would show (a) lower regression scores, (b) higher post-frustration learning scores, and (c) higher stereotypy scores, than Unstable patients. The expectation is upheld for the regression scores by a variance ratio for the two groups of patients, which is significant at the 0.01 level of P. The expectation is also upheld to a slight, but insignificant extent, for the learning scores, but not by the stereotypy scores. (Regression scores: Stable group—mean 41.5, variance 164.1, N 50; Unstable group—mean 43.42, variance 61.7, N 25.) Of some theoretical interest it should be noted that four patients unable to learn the post-frustration task were rated as Stable, and another four also unable to learn after frustration, were rated as Unstable.

Data from the specific stressor techniques support the hypothesis more strongly. For the conditioning score the following distribution is significant at the 0.01 level of P ($\chi^2=8.69$).

						Conditioning Score—CR's	
						4-6	<4 or >6
Stable group	..	..	..	..	..	18	25
Unstable group	..	..	..	..	..	2	22

For the 25 Stable group subjects who show extremity scores, 15 lie below score 4, and 10 above score 6. For the 22 Unstable group who show extremity scores, 13 lie below score 4, and 8 above score 6. Figure 4 shows the frequency distribution curves, and brings out clearly the marked differences between the two groups. The curve for the Stable group is unimodal but that of the Unstable group indicates bimodality.

The other specific stressor index is the VRP score, and again the distribution supports the hypothesis, as follows:

						VRP—Volts	
						90-159	<90 or >159
Stable group	..	..	..	..	..	56	7
Unstable group	..	..	..	..	..	23	10

For this table the value for chi squared is 6.04, which is significant at the 0.01 level of P. For the 7 Stable group extremity scores, 2 are below 90 volts, and 3 above 159 volts. For the 10 Unstable group extremity scores, 5 are below score 90 volts and 5 above 159 volts.

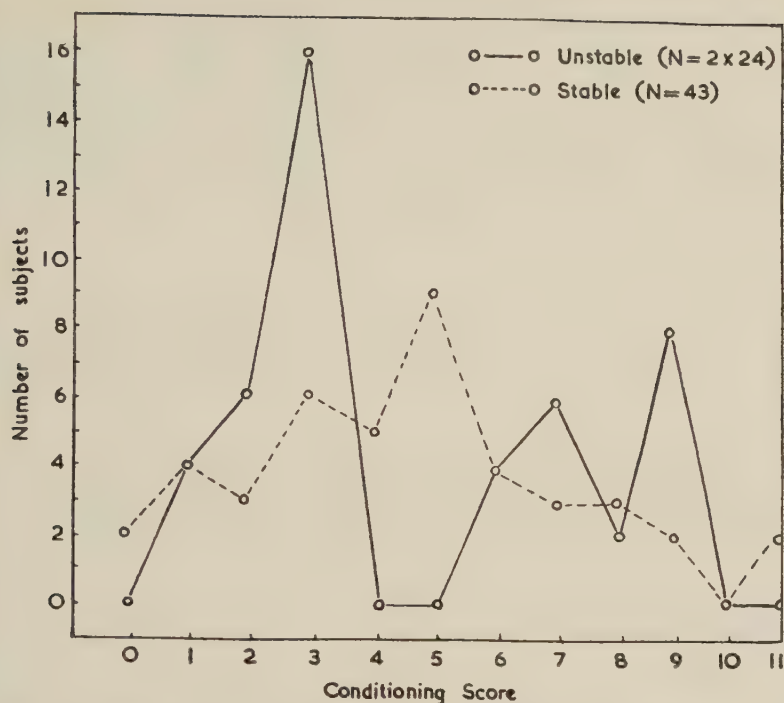


FIG. 4.—Distribution of Conditioning Scores for Stable and Unstable Patients.

In general these various data are fairly clear-cut and provide quite substantial evidence in support of the hypothesis that high degree inhibitory functioning is associated with instability, and that less intensive stress inhibition is associated with stability, with the proviso that hyper-excitation is also indicative of instability.

Types of Criminal Behaviour

There is some evidence to suggest that different types of criminal behaviour may indicate fundamental structural personality differences for the subjects concerned (54, 55, 60). In support of this there is also evidence which indicates different relapse rates for different forms of offender (42, 48, 60). Although in the current early stages of research a legal classification can be applied, it is obvious that this will eventually prove to be too crude and further clinical subdivisions must be determined. The formal hypothesis given below proposes that the personality differences reflected by different conduct disorder habits are differences of reactivity to stressors. In broad terms, one would expect behaviour such as indecent assault (when this is not attempted rape), which resembles the incomplete behaviour of experimentally neurotic animals (7), and which carries a relatively good prognosis, to be the behaviour of agitated, anxious, possibly neurotic subjects likely to be highly reactive to laboratory stressors. Rorschach data (54), persistence and GSR data (55), and the results of a 17-ketosteroids study (18), would support this view. Aggressive sex behaviour, which appears to be hyper-normal, could possibly be the outcome of fortuitously summated drives, one of which is a stress drive and the other a normal sex drive. (The notion of an abnormally high sex drive alone cannot

explain this behaviour satisfactorily. Rape, for example, is not performed often by the same person, and a rapist rarely shows evidence of frequent sex behaviour, promiscuity, etc. In addition, patients speak of precipitating emotional upsets.) Indecent exposure and larceny, however, are conduct disorders which respond poorly to therapy and penological training—factors which suggest poor emotional responsiveness (primary sociopathy), and little reactivity to laboratory stressors.

Classification of Disordered Behaviour

A total of 181 non-psychotic subjects were classified into six exclusive groups according to the type of pre-admission behaviour disorders. A seventh group, Homosexuality, is also used but the data are examined separately, as this group contains subjects falling also into the other groups. The classifications are:

1. A history of some form of *Illegal Intercourse* with a female irrespective of any other form of behaviour disorder recorded (sex or non-sex); this includes rape, attempted rape, intercourse with a female defective or a female under 16 years of age (24 subjects).

2. A history of *Indecent Exposure* as the only sex offence recorded, irrespective of any form of non-sex disorder recorded (7 subjects).

3. A history of *Indecent Assault* on a girl or woman (not an attempt at intercourse), as the only sex offence recorded, irrespective of any non-sex disorder, recorded (29 subjects).

4. A history of *Violence Only* (to some person), not for the purpose of sex or larceny (39 subjects).

5. A history of *Larceny Only* with no other form of behaviour disorder recorded, but not including larceny by violence (37 subjects).

6. A history of *Violence and Larceny* either on the same occasion or on different occasions, with no other form of behaviour disorder recorded (34 subjects).

- (7. A history of *Homosexuality* with or without any other form of misbehaviour recorded. This group of 24 subjects is separate from the others owing to its non-exclusive nature.)

Hypothesis. There are differences in the stress reactivity measurements for these various groups varying from high reactivity for Indecent Assault sex offenders, to low reactivity for the Larceny Only group, and the Indecent Exposure group.

Results. According to the hypothesis VRP scores should differentiate the disorder groups, e.g. low scores for Indecent Assault, and high scores for Larceny Only. Conditioning scores should differentiate by high scores for Indecent Assault and low scores for Larceny Only. The data in Table III support the hypothesis quite strongly. For VRP scores a variance analysis yields a value for F of 2.56 ($P=0.05$), and for the conditioning scores $F=3.33$ ($P=0.01$). A direct comparison of the conditioning scores for Indecent Assault and Larceny Only is particularly interesting, as is shown by the following table ($\chi^2=13.66$, $P=0.001$).

TABLE III
VRP and Conditioning Scores for the Five Main Disorder Groups

Disorder Groups	VRP Score			Conditioning Score		
	N	Mean	Variance	N	Mean	Variance
Indecent assault ..	28	118.1	475.5	21	6.14	7.7
Illegal intercourse ..	20	131.8	456.2	15	5.80	9.5
Violence only ..	32	120.9	574.4	19	4.58	5.7
Violence and larceny	33	128.2	434.9	26	4.54	8.0
Larceny only ..	26	135.5	572.5	22	3.45	8.3

						Conditioning Score
						<7
						>6
Indecent assault subjects ..	..	..	..	..	..	11
Larceny only subjects ..	..	..	..	..	..	22
						0

The results for the Indecent Exposure subjects are too meagre for inclusion in the table, but the trend is in support of the hypothesis. Seven of the group were examined for VRP scores, 5 giving scores above 129 volts, i.e. high scores; six were examined for conditioning scores, 5 giving less than 5 CR's, i.e. low scores—poor stress reactivity.

The data provided by the generalized stressor technique, the Frustration Task indices, do not differentiate so well as those of the specific stressors given above, but in general, support the hypothesis. We noted earlier that more subjects who are highly stress reactive fail to learn the pre-frustration tasks than do others. We would therefore expect more Indecent Assault subjects to be screened off from the frustration period in this way, than other subjects. This was in fact found to occur with a subsequent loss in the differentiating power of the generalized stressor technique. All except one of the remaining Indecent Assault subjects demonstrated a fall in temperature during the period of frustration, whereas for all the other groups about 50 per cent. demonstrated a fall in temperature and the other 50 per cent. a rise or no change. This supports the hypothesis of relatively high stress reaction for Indecent Assault subjects. Further support for the general hypothesis is provided by the data in Table IV

TABLE IV
Regression and Post-Frustration Learning Scores for the Five Main Disorder Groups

Disorder Groups	Regression Score			Post-Frustration Learning Score		
	N	Mean	Variance	N	Mean	Variance
Indecent assault ..	15	42.3	162.6	15	20.4	314.0
Illegal intercourse ..	14	38.6	193.0	14	21.6	356.4
Violence only ..	26	41.0	80.0	26	16.5	197.5
Violence and larceny	22	44.0	69.2	22	11.8	79.1
Larceny only ..	25	38.8	118.7	25	12.7	76.4

which shows the regression scores and post-frustration learning scores of the groups. A comparison of the regression scores for Indecent Assault subjects and Larceny Only subjects yields a value for F of 2.4, significant at the 0.05 level of P, and a comparison of the learning scores for the same groups yields a value for F of 4.23, significant at the 0.01 level of P. Stereotypy scores yielded no significant differences.

The small Homosexual group does not allow for useful statistical analysis. However, differentiation according to Indecent Assault and Other Homosexuality indicates greater stress reactivity for homosexual Indecent Assault subjects similar to that of heterosexual cases. Again the specific stressor indices differentiate better than the frustration task scores. The mean CR score for Indecent Assault subjects ($N=6$), is 6.8, variance 12.6, and for Other Homosexuality cases ($N=8$), the mean is 4.62, variance 7.5.

Prediction of Relapse

The ultimate purpose of this research is to determine the structural personality factors which contribute towards relapse and continued instability. It is clear that reliable data will only be obtained from a relatively long term study when the data of several hundred discharged patients are analysed. The present assessment is therefore a pilot analysis simply to determine whether or not stress reactivity appears to be fundamentally associated with social instability, as we have postulated, and also whether the particular indices carry any predictive validity.

A patient is discharged from the State Institution when the medical superintendent recommends discharge on the grounds that the patient no longer possesses "dangerous or violent propensities". From the earlier observations we would expect that social relapse would be associated with either very high stress reactivity or very low reactivity. However, very high stress reactivity is demonstrated by agitated, emotionally disturbed patients who are very unlikely to be regarded as stable and fit for discharge in the light of a clinical assessment. The formal hypothesis, given below, is based upon this point and assumes therefore, that social relapse patients will be mainly drawn from very low reactivity subjects.

The test data of 22 patients definitely known to have relapsed after discharge were compared with the data for 32 patients *believed* not to have relapsed within one year of discharge. Obviously, such a comparison is weighted in an adverse direction owing to the short period of risk and the absence of definite knowledge concerning "success".

Hypothesis. Patients discharged owing to apparent stability and who subsequently relapse will be mainly subjects showing little stress activation.

Results. All the various stress indices lie in the direction predicted by the hypothesis, but again the most satisfactory results are those provided by the specific stressors. The conditioning scores are particularly interesting as is shown by the following table in that only one subject in the Relapse Group is misclassified ($\chi^2=6.50$, $P=0.01$; one cell is weak).

							Conditioning Score	
							<7	>6
Success Group	..	..	..	..	..	..	16	10
Relapse Group	..	..	..	..	..	..	18	1

Similar trends are apparent for the VRP scores but there is weaker differentiation:

							VRP—Volts	
							<130	>129
Success Group	..	..	..	..	..	..	16	16
Relapse Group	..	..	..	..	..	..	7	15

For the frustration task scores we would first predict slight or zero temperature change for Relapse subjects (absence of stress activation), and temperature decrease for Success subjects, and this is in fact the case. (Relapse Group, $N=15$, mean temperature change, 0.006°C ., variance 0.23 ; Success Group, $N=22$, mean temperature change, 0.24°C ., variance 0.16 .)

The hypothesis requires relatively high regression scores, and relatively low stereotypy scores, and low post-frustration learning scores for the Relapse Group. This trend was found to exist but only in the case of the learning scores did there appear a significant difference from those of the Success Group.

FAMILIAL ENVIRONMENT FACTORS

The previous studies have all demonstrated that the index most closely tied to the various social criteria, is the autonomic response to the specific stressor, i.e. the conditioned galvanic skin response. For this reason this final note concerns the autonomic conditioning index alone.

The previous studies give general support to the notion that stress reactivity is fundamentally associated with delinquent and psychopathic instability. In contemporary literature delinquency is frequently linked with the occurrences and traumata of early childhood. On the other hand, psychopathy is frequently postulated to be a mainly non-psychogenic disorder. On the assumption that there are two forms of instability, as was found in the earlier studies, corresponding to very high and very low stress reactivity, it remains to determine what relationship exists between these two categories and early environmental factors. The subjects were 80 consecutive male admission patients, none of whom were included in the previous studies. The test score analysed is the GSR conditioning score described above.

Results

For this group it was found that the conditioning score correlated slightly with Wechsler I.Q. ($r=0.23$, $P=0.05$; mean I.Q. 76.87 , variance 162.7), and to a similar extent with Raven's Matrices score. A further correlation was found for the conditioning score and age at the time of testing ($r=0.4$, $P=0.001$; mean age 26.35 years, variance 104.9), and with age at the time of first Court appearance for those subjects who had appeared before a Court on any occasion ($r=0.4$, $P=0.01$; mean age 14.02 years, variance 15.3 , $N=69$). The age at testing correlation is probably due to the fact that sex offenders who tend to be of higher conditionability also tend to be older on admission to the State Institution than do other subjects. The age of first conviction correlation is probably linked with another known fact that early first conviction is associated with social failure for most delinquents (42).

For only 28 of the 80 subjects was the parental background complete in the sense of both parents being alive and living together, for 21 subjects the parents were separated or divorced or never lived together, and in 31 cases one or both parents were dead. The differences in the conditioning scores of these groups are insignificant and indicate no relationship between conditionability and contemporary home conditions. There is also no correlation between CR score and age of admission to an institution of any sort ($r=0.08$, mean age 12.45 years, variance 44.4). For 30 subjects there was evidence of deprivation or trauma in the first two years of life and for 50 subjects there was no such evidence. There is no significant difference between the con-

ditioning scores of these groups, but there is a slight trend indicating *higher* stress reactivity following early trauma.

The conditioning score in respect of family placement indicated a slight trend towards higher conditionability for the first or only child. Subjects in this category gave significantly higher scores than those falling in a "middle child" category ($P=0.05$). This difference appeared to be centred upon the score of the first child of a family rather than the only child.

These various data indicate that whatever the weighting of environmental and constitutional factors which leads to admission to the State Institution, these factors do not markedly differentiate the form of stress reactivity, of the subjects. There is a slight suggestion that non-genetic factors such as family placement influence the conditioning score in that first children show higher conditionability—high stress reactivity. So far as they go, therefore, the data would indicate simple psychogenic factors as being important for the high stress reactivity group and other factors for the low stress reactivity type of instability.

GENERAL DISCUSSION

From these various studies one can conclude that laboratory indices of stress reactivity are undoubtedly correlated with the problems of social instability and the form of instability of psychopathic and delinquent subjects. This is of some practical importance in that stress assessment techniques can be applied to subjects beyond the reach of most psychological tests owing to low I.Q., illiteracy and personal unreliability factors. For the general theory of stress reactivity it is important to note that there is a very high degree of inter-index agreement for highly reactive subjects but more variability for other subjects. This observation is directly relevant to the problems of autonomic response variability (33–39).

For the theory of delinquent and psychopathic behaviour the important result is the demonstration of two forms of instability, a finding in line with Eysenck's theory and the notions of Primary and Neurotic Sociopathy (40), and a finding which would explain the differences in relapse potentiality. For frustration research it is clear that regression and position stereotypy are reactions of different logical or psychological orders.

For the social behaviour disorders, one can suggest that two forms of learning, or two forms of habit are involved. One concerns escape learning, when stress is necessarily activated (high reactive instability), and the other involving traumatic avoidance learning when stress is inhibited or conserved (51). This would explain the relatively poor therapeutic response of low conditioners and indicate that therapies must take into account these reactivity variables. One can also conclude that these variables must be taken into consideration in, and may even be fundamental to, issues of prognosis or prediction. They are the sort of variables which could well respond to specific therapeutic devices. Finally, of technological importance, it should be noted that the index most highly correlated with the various social criteria is the autonomic response to a specific stressor, GSR conditioning, which reduces extraneous factors to a minimum.

SUMMARY

To investigate the importance of anxiety or stress reactivity in the personality structure of delinquent and psychopathic male adults, subjects were examined by four techniques assessing the overt and autonomic responses to specific and generalized stressors, respectively. The inter-relationships of the various responses are assessed and indicate that stress reactivity

ranges from extreme excitation to extreme inhibition, with a certain amount of inter-test and inter-response agreement. Subjects rated Unstable were found to fall at one or the other of the two extremes of stress reactivity, and Stable subjects to demonstrate moderate reactivity. Different forms of conduct disorder were found to be associated with different forms of stress reaction. Subjects who demonstrated subsequent social instability were found to be of low stress reactivity. The final study indicated a slight trend towards higher reactivity for subjects with histories of psychological trauma.

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SUSCEPTIBILITY TO METHYLPENTYNOL: PERSONALITY AND OTHER VARIABLES

By

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SUSCEPTIBILITY to drugs is a biological variable, and Clark (1933a) remarks that for organisms sufficiently large to permit measurement of individual dosage, the curves relating dose and incidence of effect are sigmoid and can be assumed to express the individual variation of the population. Some of the variables determining drug response include age, sex and body weight (Goodman and Gilman, 1955). Although a relation between personality and drug response has always been alleged, Kennedy (1957) alluded to the lack of work in this field.

Eysenck (1957a) cogitated this problem. He quotes McDougall (1929): "I have observed in a number of cases that the marked extraverted personality is very susceptible to the influence of alcohol. The introvert, on the other hand, is much more resistant to alcohol." This is casting the net wider, embracing the feasibility of subjective and objective changes to the drug response being determined by personality.

Methylpentynol ("Oblivon") is an unsaturated tertiary alcohol, and the phenomena found during adverse response to the substance have been portrayed (May and Ebaugh, 1953; Marley, 1955; Marley and Chambers, 1956). This paper analyses the significance of a number of factors, including personality, conceivably contributing to methylpentynol susceptibility.

METHODS

Fifty-four subjects were first investigated (24 males, 30 females) aged 18-60 years with a weight range of 47.3-126.4 Kg. (Group 1). Of these, 36 individuals (14 males, 22 females) suffered from neurotic or psychosomatic disorders. The remainder (10 males, 8 females) were volunteers with no psychiatric history. Patients with factors known to alter response to drugs (drug addiction, hepatic or renal impairment, previous brain injury) were excluded. Methylpentynol was incriminated as hepatotoxic by Schaffarzick and Brown (1952) but experience with methylpentynol carbamate (Bartholomew *et al.*, 1959), a drug 3-4 times more potent than methylpentynol, makes it evident that, for the five days methylpentynol was prescribed, no abnormality

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of liver function was likely. This is important, as the drug is excreted as a glucuronide (Perlman *et al.*, 1953) and impaired liver function might result in accumulation of the substance. The contribution of other factors likely to influence response to drugs, namely age, body weight and sex, are considered under Results. As anaemia prolongs the action of narcotics (Dundee, 1952) the possible relation between haemoglobin levels and susceptibility to methylpentynol was considered. Sedated basal metabolic rates were determined for a few individuals prior to commencing methylpentynol to exclude any connection between susceptibility to the drug and metabolic rate.

To tackle the problem of personality and drug susceptibility, use was made of tests elaborated by Eysenck (1953, 1956, 1957b). These included a questionnaire and apparatus to determine Kinaesthetic After-Effect and Reminiscence Effect, measurements alleged to objectify certain aspects of personality. Eysenck conceives of at least two personality dimensions, "Neuroticism-Normality" (N-N) and "Extraversion-Introversion" (E-I), each a continuum and orthogonal to one another.

The questionnaire, Maudsley Personality Inventory (MPI), has been developed by Eysenck from the Guilford questionnaires (Guilford and Guilford, 1934, 1936, 1939a, b) and from the Maudsley Medical Questionnaire. It consists of 80 items, 24 related to N-N, 24 to E-I and the remaining 32 being concerned with a lie scale or included as "spares". In this study only the 48 items related to the two personality dimensions were utilized. Three responses are possible. Prior to the present investigation Bartholomew (1955) tested 200 males and 200 females with this questionnaire, scoring an answer in conformity with the key as 1, that not in conformity as 0, and an answer expressing uncertainty as a $\frac{1}{2}$. He found the mean scores for the combined sexes on the N-N scale to be 9.12 (S.D. 5.16) and that for the E-I scale to be 11.26 (S.D. 4.64) with little discrepancy between the mean scores for the sexes. To be certain the questionnaire had predictive reliability, a test-retest correlation over a period of a year was determined and found to be satisfactory (Bartholomew and Marley, 1959).

The Kinaesthetic After-Effect (KAE), which is alleged to correlate with extraversion, was determined by the apparatus and method advocated by Eysenck (1955). From this test three scores (KAE 1, 2 and 3) were obtained.

The Pursuit Rotor has also been described by Eysenck (1956). The score derived with it is designated the Reminiscence Effect. This score is alleged to correlate with extraversion.

Each of the 54 individuals was prescribed 0.5 g. of methylpentynol q.d.s. for 5 days, a base line of individual reaction being obtained by the prior administration, for the same period, of an identical number of inert capsules, the tests being performed in the above order for all subjects during the control period. This was essential, as Franks and Laverty (1955) demonstrated that another central depressant (amylobarbitone sodium) increases extraversion scores measured on the Guilford R scale.

The clinical response to methylpentynol was graded into Nil, Minimal and Maximal toxic categories (Marley and Bartholomew, 1958). The prototypes of clinical response to methylpentynol are briefly portrayed. A maximal toxic reaction (Clinical Grading 3) was deemed present if it included a majority of the following: dilated pupils reacting sluggishly to all stimuli, sustained nystagmus on conjugate lateral gaze, diplopia, ptosis, loss of tone in the facial musculature, dysarthria and a fine tremor of the protruded tongue. A cerebellar type of ataxia might be found in the limbs or an admixture of this with posterior

column type of ataxy and a positive Romberg sign. Alterations in the mental state included mood disturbance and impairment of attention, concentration and abstract thought. A minimal toxic reaction (Clinical Grading 2) was epitomized by little more than nystagmus on conjugate lateral gaze and perhaps slight unsteadiness of gait or drowsiness. Mood alterations were also evident. The designation of nil toxicity (Clinical Grading 1) is self explanatory.

Finally, one year after the completion of the main investigation, 15 of the original 54 subjects were retested for susceptibility to methylpentynol. At the same time, a further 40 subjects ("Normals" and patients with neurotic and psychosomatic illnesses) were prescribed 0.5 g. q.d.s. of methylpentynol for 5 days, and the relation of personality (as assessed on the M.P.I.) to susceptibility to the drug ascertained (Group 2).

RESULTS

Of the 54 subjects (Group 1) 17 developed a maximal toxic picture, 15 were minimally affected and the remainder were unaffected by the 5-day regime of methylpentynol (Fig. 1).

The possible relation of somatic and personality variables to methylpentynol susceptibility is now examined.

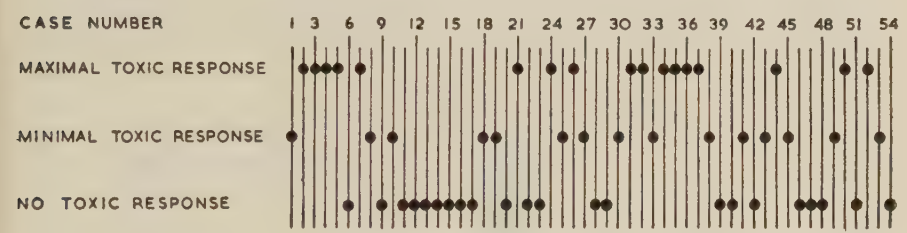


FIG. 1.—Categories of response to methylpentynol in 54 subjects.

Somatic Variables and Susceptibility to Methylpentynol

1. Age. The age distribution of the combined sexes and the Clinical Gradings for response to methylpentynol are presented (Table I). No statistically significant correlation was found between age and the likelihood of developing toxic phenomena with the drug ($\chi^2=3.42$; $p>0.05$; $df=2$).

TABLE I

Relation of Age for the Combined Sexes (Group 1) to Response to Methylpentynol

Clinical Grading				Age in Years			
	1	2	3	N	0-25	26-35	36-60
1	..	..	..	22	8	6	8
2	..	..	..	15	3	8	4
3	..	..	..	17	7	5	5

2. Body Weight. The mean weight in pounds, range and standard deviation for the three Clinical Gradings are depicted in Table II. It was found on analysis

TABLE II

Relation of the Mean, Range and Standard Deviation of Body Weight to Response to Methylpentynol (Group I)

Clinical Grading				Weight in Pounds		Standard Deviation
			N	Mean	Range	
1	..	..	22	147.2	104-278	34.2
2	..	..	15	137.6	106-212	31.3
3	..	..	17	146.0	108-209	25.6

of variance that there is no statistically significant difference between mean body weight for the three groups of subjects ($F=0.44$) despite their dissimilar susceptibility to the drug, thus precluding any relation between body weight and susceptibility to methylpentynol.

Source of Variation	df	Sum of Squares	Mean Square	V.R.	p
Between samples	2	913.8	456.9	0.44	>0.05
Residual	51	51938.2	1036.3		
Total	53	52852.0			

3. *Sex.* The data in respect of the sex distribution for the Clinical Gradings of response to methylpentynol are shown in Table III. There is no significant

TABLE III

Relation of Sex Distribution to Response to Methylpentynol (Group I)

Sex						Clinical Grading		
						1	2	3
Male	..	..	..	..	..	10	5	9
Female	..	..	..	..	..	12	10	8

correlation between sex and liability to develop toxic signs with methylpentynol ($\chi^2=1.31$; $p>0.05$).

4. *Haemoglobin.* The mean haemoglobin values (grams per cent.) with the range and standard deviation for the three Clinical Gradings are presented in Table IV. The number of subjects to which this Table refers is 33. A two-way

TABLE IV

Relation of the Mean, Range and Standard Deviation for Haemoglobin Level to Response to Methylpentynol for 33 Subjects of Group I

Clinical Grading				Haemoglobin Values (G. per cent)		
			N	Mean	Range	Standard Deviation
1	..	..	9	13.3	10.3-15.6	1.45
2	..	..	12	12.7	10.1-15.3	1.76
3	..	..	12	13.1	9.3-15.3	1.48

analysis of variance was performed. The finding of a variance ratio of 0.31 confirms that there is no statistically significant difference between the mean haemoglobin values for the three gradings and thus no relation between susceptibility to the drug and haemoglobin level.

Source of Variation	df	Sum of Squares	Mean Square	V.R.	p
Between samples	2	1.61	0.85	0.31	>0.05
Residual	30	77.95	2.59		
Total	32	79.56			

5. *Hepatic and Renal Function.* As indicated under Methods, subjects with a history of hepatic or renal disease or damage were excluded from the group. It has already been stipulated that abnormality of hepatic function could not be attributed to the effect of the drug itself and routine tests of renal function showed no change during the drug administration.

6. *Sedated Basal Metabolic Rate.* A sedated basal metabolic rate was obtained for 8 patients prior to commencing the drug (Cases 24-27, 32, 33, 35 and 36). The results ranged between -6 and +10 per cent. and there was no relation to susceptibility to methylpentynol.

Personality Variables and Susceptibility to Methylpentynol

The distribution of extraversion (as measured on the M.P.I.) for the 54 subjects is shown in Figure 2. The mean E score from the raw data was 12.28 (S.D. 5.26) which is only slightly greater than that for the standardization series.

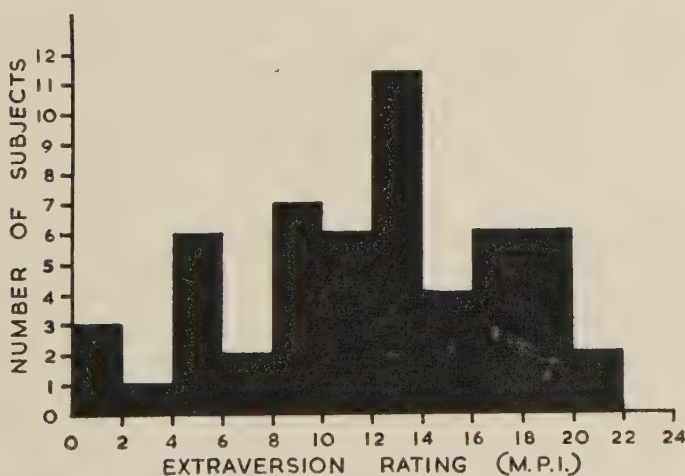


FIG. 2.—Histogram for distribution of the individual raw extraversion scores derived from the Maudsley Personality Inventory (54 subjects).

The distribution of neuroticism (as measured on the M.P.I.) for the 54 subjects is shown in Figure 3. The mean N score from the raw data was 14.85 (S.D. 5.79) as compared with a mean N score of 9.12 for the standardization series. The high mean N score obviously derived from the inclusion of patients with neurotic illnesses. (As the N distribution is skewed, the possibility that transformation of the data might assist in their interpretation was excluded by employing the recommendations of Davies (1954). This involves, for the three gradings of susceptibility to methylpentynol, plotting the standard deviations of the three N scores against their three mean N scores, their variances against

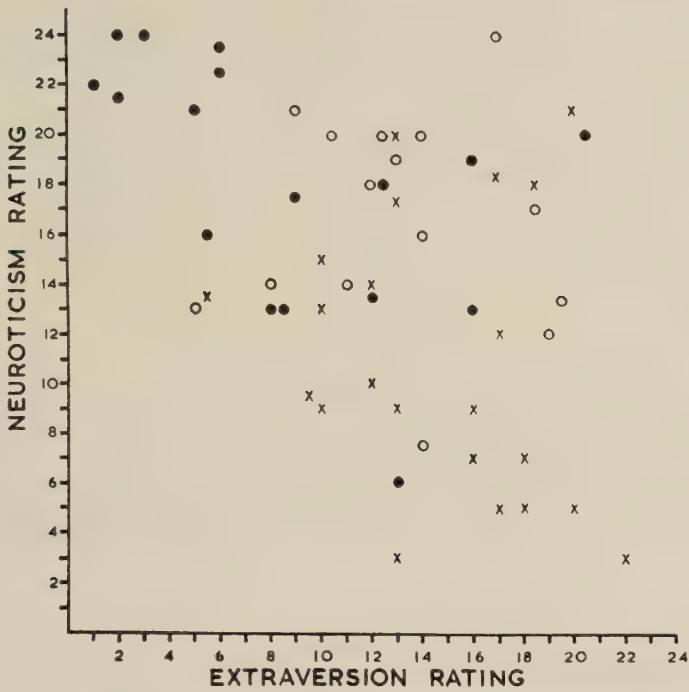


FIG. 4.—Scatter diagram of individual raw scores for extraversion and neuroticism in relation to response to methylpentynol of 54 subjects.

● ≡ Clinical Grading 3 or maximal toxicity.
○ ≡ Clinical Grading 2 or minimal toxicity.
X ≡ Clinical Grading 1 or normal response.

(χ^2 for the uncorrected data was 6·12; $p>0\cdot05$.) Both figures suggest an association between susceptibility to methylpentynol and E-I as measured on the M.P.I. However, as the value for chi-squared is just statistically significant, the data were rearranged into a 2×2 contingency table and assessed using an arc sine transformation (Table VI). There was no significant difference between the proportion of individuals (18 out of 32 and 9 out of 22) falling into the lower half of the E-I dimension (Critical Ratio=0·78; $p>0\cdot04$). This combined with the fact that equal numbers of individuals in the upper E range fell into the susceptible and non-susceptible groups, suggests that any relation between the E-I continuum and susceptibility to methylpentynol is of equivocal importance.

TABLE VI						
Relation of a Twofold Grouping of the Individual Responses to Methylpentynol to an Extraversion Rating in the Upper or Lower Halves of that Continuum (Group 1)						
Extraversion Rating						Clinical Grading
						1 2 and 3
0·0-12·49	..	..	..	..	..	9 18
12·5-24·0	..	..	..	..	..	13 14

Neuroticism. The distribution of the three Clinical Gradings for response to the drug in terms of the corrected N score, categorized into upper (12.50–26.24) and lower (0.0–12.49) levels, is set out in Table VII. The results

TABLE VII

Relation of the Individual Responses to Methylpentynol to a Neuroticism Rating in the Upper or Lower Portions of that Continuum (Group 1)

	Neuroticism Rating						Clinical Grading		
							1	2	3
0.0–12.49	..	..	..	..	..	..	14	3	3
12.5–26.24	..	..	..	..	..	..	8	12	14

were assessed by determining χ^2 , a highly significant value of 11.47 being obtained; $p < 0.01$, d.f.=2. (The value of χ^2 for the raw N scores was 15.66; $p > 0.001$.) Both results suggest a very definite relation between high N scores and a liability to develop toxic features with methylpentynol. Again to exclude possibility of bias, the information was evaluated using an arc sine transformation; the data is set out in Table VIII. A highly significant difference was

TABLE VIII

Relation of a Twofold Grouping of the Individual Responses to Methylpentynol to a Neuroticism Rating in the Upper or Lower Portions of that Continuum (Group 1)

	Neuroticism Rating						Clinical Grading	
							1	2 and 3
0.0–12.49	..	..	..	..	..	..	14	6
12.5–26.24	..	..	..	..	..	..	8	26

noted between the proportion of individuals falling into the susceptible and non-susceptible groups in terms of corrected N scores (Critical Ratio=3.44; $p > 0.01$). These findings confirm the association between high N scores and susceptibility to methylpentynol.

Kinaesthetic After-Effect

Only KAE(2) correlated significantly with E as measured on the M.P.I. ($r = +0.368$; $p > 0.05$). The data relating to KAE(2) and the gradings of susceptibility to methylpentynol are presented in Table IX. No association

TABLE IX

Relation of a Twofold Grouping of the Individual Responses to Methylpentynol to Scores of Kinaesthetic After Effect (2) (Group 1)

	Kinaesthetic After Effect (2) Rating						Clinical Grading	
							1	2 and 3
+98– +3	..	..	..	..	..	..	9	14
+2– –92	..	..	..	..	..	..	8	13

between them was found ($\chi^2 = 0.003$, Yates correction being applied). Contingency tables of KAE(1) and (3) are not included, as there was no association between them and susceptibility to methylpentynol.

Pursuit Rotor. No significant correlation between pursuit rotor scores and uncorrected E values was found ($r = +0.141$; $p > 0.05$) nor was there a significant relation between these and susceptibility to methylpentynol.

Personality and Specific Symptomatology. Hitherto, the relation of the drug response and personality has been confined to relating the three Clinical Gradings to results of personality tests. The possibility of an association between personality (measured on the M.P.I.) and specific symptomatology is now contemplated.

TABLE X

Specific Symptomatology and Mean Personality Ratings for E and N (all Scores are Uncorrected) for Group 1

	n	Mean E Score	Range	Mean N Score	Range
Total group	54	12.28		14.85	
Behaviour:					
Overactivity	5	11.4	8.5-17.0	15.6	9.0-21.0
Aggressive	6	15.3	8.0-20.5	16.8	12.0-24.0
Mood:					
Elation and euphoria	14	14.1	8.5-22.0	14.0	3.0-21.0
Depression and irritability	23	11.6	2.0-20.5	16.8	6.0-24.0
Illusions and hallucinations	4	10.2	3.0-17.0	22.5	18.0-21.0
Disorders body image and allied states	10	8.9	2.0-19.0	16.6	6.0-24.0
Disordered subjective time experience	20	11.4	2.0-19.5	17.1	3.0-24.0

The material in Table X is comprised of uncorrected E and N scores, these differing little from the corrected E and N values. Little emerges, presumably because of the few individuals involved. The mean E and N uncorrected scores for subjects with affective changes deviates little from that of the group as a whole, patients with disorders of body image or allied phenomena tended toward introversion, whereas individuals displaying aggression while receiving the drug proved to have a mean uncorrected E score above that of the group.

Personality and Prediction of Susceptibility. An anterospective prediction regarding whether the subject would prove susceptible to methylpentynol was made for 29 patients from a knowledge of their raw N scores on the M.P.I. The prediction proved correct in 24 instances. Inevitably, a number of these predictions had to be made for individuals with uncorrected N scores of 13 and 14 which is approximately that of the mean raw N score for the group. In these subjects, factors such as clinical impression and diagnosis might have biased the predictions. Therefore a retrospective prediction was made that subjects with a raw N score greater than 15 would have manifested susceptibility to the drug. Of the 27 individuals so rated, the prediction proved correct for 21.

Susceptibility to Methylpentynol and Clinical Diagnosis. The distribution of the clinical ratings for response to methylpentynol and diagnosis are depicted in Table XI. It can be seen that the bulk of individuals considered normal

TABLE XI

Relation of Response to Methylpentynol and Diagnosis in Group 1

Diagnosis	N	Clinical Grading		
		1	2	3
Anxiety state	6	1	2	3
Obsessional state	1	0	0	1
Mixed neurotic reaction	22	3	10	9
Conversion hysteria	1	0	0	1
Psychopathic personality	6	3	1	2
Normal	18	15	2	1

DISCUSSION

Although Mellanby (1919) in his classic work on the absorption and disappearance of alcohol from the blood gave the substance to dogs by gavage, the ideal way of studying the tolerance to methylpentynol would have been by administering the substance intravenously on a dose-weight, or a dose-surface area basis as did Newman (1935) with ethanol. However, methylpentynol in large doses given intravenously is a respiratory depressant (Marley, 1959) and in view of this potential hazard the oral route was preferred.

Eggleton (1941) found an association between central nervous system disturbance and blood alcohol concentration. It may then be argued that patients susceptible to methylpentynol were those with the highest blood methylpentynol concentration, that is, those absorbing the greatest quantities of the drug from the gastro-intestinal tract. There are two reasons why this is unlikely. The first is that methylpentynol rapidly crosses the stomach wall (Marley and Vane, 1958) and the second, that Bartholomew, Bourne and Marley (1958) found that the mean blood methylpentynol concentration over a 5-day period was identical in patients manifesting toxic signs and in those who did not.

Another objection to the validity of our conclusions could be that the Maudsley Personality Inventory has no significant test-retest reliability, but this was shown not to be so (Bartholomew and Marley, 1959). Nevertheless, the subject's response to the drug might have been fortuitous for Tucci *et al.* (1949) have stated that the effect of another central depressant (barbiturate) varies in the same individual on successive days. This factor was also demonstrated not to be important as 13 out of 15 patients responded identically to the drug on two similar 5-day regimes with a lapse between of one year.

Another objection could be that the mean neuroticism score for the first population was one standard deviation above that for the standardization series. As two-thirds (32 individuals) of this group manifested susceptibility to methylpentynol, it is to be anticipated that liability to intoxication would show some correlation with high neuroticism scores. This, however, would not explain why only 3 subjects of the 13 with a corrected neuroticism score below 10 (the neuroticism mean for a normally distributed population) displayed susceptibility, whereas 29 of the 41 individuals with a corrected neuroticism score over 10 developed toxic symptoms. The same criticism cannot be levelled at the relation between susceptibility to methylpentynol and extraversion, as the mean value and scatter for this variable deviated little from the standardization series.

To clarify further our findings, the response of another group of subjects to methylpentynol was studied. Again there was a clear correlation between high neuroticism scores and susceptibility to the substance. It is imperative to stipulate that the apparent relation between susceptibility to methylpentynol and neuroticism is no more than an observed association, and that no causality is being advocated. The results were only deemed valid in the first study after somatic variables known to affect response to drugs had been excluded.

Having acknowledged these possible demerits, then our results contradict McDougall's assertion (McDougall, 1929) that it is the extraverted personality who is susceptible, and the introverted subject who is resistant to alcohol. Methylpentynol is a branched 6-carbon alcohol (molecular weight 98; molecular weight of ethanol 46) and as the activity of an alcohol increases with the size of its molecule (Gaddum, 1956) one would have supposed that the results from

administering the drug would emphasize rather than refute McDougall's findings.

Eysenck (1957c) considered the most important variable in predicting the effect of a drug to be the excitation-inhibition ratio (in the Pavlovian sense) for the person concerned. Pavlov (1927) had found that dogs with dissimilar constitutions are differently susceptible to bromide. Pavlov's "strong excitatory" dogs, which easily developed stable conditioned salivary responses, needed eight times the dose of bromide than a dog of the same body weight but with a "weak inhibitory" constitution, and which developed conditioned salivary responses with difficulty. Franks (1957) showed that conditionability in the human was linked with extraversion-introversion (extraverts condition badly, introverts condition well) but was unrelated to neuroticism. However, no correlation was found in human subjects relating susceptibility and conditionability (Bartholomew, Franks and Marley, 1958).

Shagass (1954) describes a technique for estimating the sedation threshold. This purports to be an objective pharmacological measurement deriving from electro-encephalographic and speech changes concurrent with the intravenous injection of amylobarbitone sodium. Shagass concluded that the sedation threshold is an index of anxiety. Shagass and Naiman (1956) elaborated this argument, contending that extraverted individuals (hysteries and psychopathic personalities) have a low sedation threshold, whereas introverted subjects (dysthymics) have a high threshold. As the alterations in the electro-encephalogram and speech taken as the end points for the sedation threshold are those indicating intoxication by the drug, it follows that extraverted individuals should manifest susceptibility to central depressants while introverted patients would be resistant.

Shagass's work has incurred justifiable criticism (Thorpe and Barker, 1957; Pampiglione, 1958). Pampiglione could demonstrate a definite sedation threshold in only one-third of 58 patients. He concluded, "The epiphenomenon of anxiety does not bear recognizable relationship to the patient's resistance to a sedative of the kind employed". Dickel and Dixon (1957) found that of 8,200 individuals given tranquillizing drugs 4-5 per cent. developed physical disturbances during treatment, while over 30 per cent. showed behavioural changes or striking alteration of their mental state. They linked the presence of anxiety with an adverse response to drugs. These findings are not only in sympathy with our own, but cast doubt on Shagass's contention that anxiety can be equated with a high sedation threshold and that only one personality dimension (E-I) is linked with drug susceptibility.

Similar side-effects to those noted in our subjects have been seen after placebos, Beecher (1955) recording 35 such "toxic" effects. While it is easy to comprehend signs such as ataxia appearing after administration of inert substances, it is more difficult to explain findings like nystagmus. Nevertheless, if the bulk of side-effects seen with placebos correspond with those encountered after the administration of methylpentynol and occur exclusively in subjects with high neuroticism scores, then it would be difficult to substantiate our thesis. However, none of the physical signs encountered with methylpentynol were seen when the subjects were receiving inert capsules, and Trouton (1957) suggested that the trait related to placebo response is not linked with primary suggestibility, and therefore neuroticism, but to secondary suggestibility—a factor not associated with any personality dimension so far described.

What conclusions are to be drawn? The distribution of both neuroticism and susceptibility to drugs for the general population are known to approximate

to that of a natural curve; yet it would seem a convenient coincidence that they should be contiguous or overlap. (A similar reservation being applicable for the distribution of extraversion and susceptibility.) It could be, of course, that our two groups totalling 94 subjects are unique in that high scores for neuroticism correlate with susceptibility to methylpentynol, but this is unlikely.

Clark (1933b) refers to static and dynamic variants determining response to drugs. By static variant he implied one with a constant deviation from the mean of the particular population, there being a likelihood that the distribution of this variable would approximate to the normal or bell-shaped variety, whereas the dynamic variant alternated from one side of the mean to the other and consequently could be exemplified by many forms of distribution. It might be that neuroticism is one such static variant.

To go further and indicate any specific relation between susceptibility to the drug and central activity would be presumptuous. Certainly measures derived from other techniques purporting to quantify personality, and used by us—such as the Kinaesthetic After Effect and Pursuit Rotor—bore no relation to susceptibility to methylpentynol; indeed, none of these correlated with the N-N continuum, and only the Kinaesthetic After Effect (2) correlated with the E-I continuum.

SUMMARY

Two investigations, with one year interval between, were performed on 94 individuals. The first group (54 subjects) received 0.5 g. q.d.s. of methylpentynol orally for 5 days preceded by a similar period on inert capsules. The second group (40 subjects) received only the 5-day regime of 0.5 g. q.d.s. of the active drug.

Toxic effects appearing between the third and fifth day of the drug regime occurred in 32 subjects of the first group and in 24 of the second.

Thirteen of the 15 subjects from the first group responded identically when given 0.5 g. q.d.s. of methylpentynol for 5 days after a lapse of one year since the original investigation.

Variables such as age, body weight, sex, haemoglobin levels, basal metabolic rate, renal and hepatic function were found not to have contributed significantly to drug susceptibility in the first group.

Personality variables as determined from the Maudsley Personality Inventory did seem to be significantly associated with susceptibility to methylpentynol. Thus a toxic response to the drug was correlated with high neuroticism scores in both groups. There was a just significant but debatable association of drug susceptibility with extraversion scores noted only in the first group. Methylpentynol susceptibility was not linked with a specific diagnosis, but normal individuals tended to respond normally to the drug.

Measures obtained with other techniques purporting to quantify personality, such as the pursuit rotor and the kinaesthetic after-effect, bore no relation to the drug phenomena.

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THE PREDICTION AND ASSESSMENT OF PSYCHOLOGICAL CHANGES FOLLOWING PREFRONTAL LOBOTOMY*

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THIS paper reports the results of a series of psychological tests and behavioural scales obtained upon psychotic patients who were given prefrontal lobotomies at the Palo Alto Veterans Administration Hospital during the years 1947 through 1954. Psychological testing procedures were administered both before and at given intervals following operation, and comparisons were made of the pre-operative measures to degree of improvement. Also, an evaluation was made of changes in the measures over time following lobotomy.

During the period of this study lobotomy was considered a treatment of last resort and was used only with patients who were extremely ill and had not improved under all other available forms of therapeutic intervention. Consequently, the operated patients comprised a sample of chronic subjects such that almost any noticeable degree of improvement, had the operation not been performed, would have been doubtful.

During the period 1947-1954, 131 patients were operated, all but 4 having bilateral operations. The standard prefrontal lobotomy (Freeman and Watts, 1944) was carried out, and included sectioning in all four quadrants. Six patients had died before the follow-up criterion data used in this study were gathered in 1955. Criterion data were therefore collected on 125 patients; of these 123 were schizophrenics, and 2 were manic-depressives.

The criterion of improvement. The criterion scale used to measure improvement after operation was adapted from that used in the Columbia-Greystone (Mettler, 1949) study. In November, 1955, Dr. Kenneth P. Jones collected the data necessary to rate the 125 patients. The scale used included 5 steps, as defined below. The numbers in parentheses indicate the number of patients receiving each rating.

- 0=Minimal or no improvement, patient on disturbed ward (22)
- 1=Patient on moderately disturbed ward, no ground privileges (43)
- 2=Patient has ground privileges (36)
- 3=Patient at home, under supervision (12)
- 4=Patient at home and working or capable of working (12)

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It is to be noted that all criterion ratings were obtained at one time, in November of 1955. For all patients this was more than one year after operation; for some patients it was 7 or 8 years after operation. The differences in time after operation at which the criterion ratings were obtained does not appear to have been a major variable, however, as shown by the fact that the correlation (0.10) between criterion ratings and time after operation was not significantly different from zero. Hence the criterion ratings can be assumed to represent the overall status of the patients one or more years after lobotomy.

The lobotomy psychology testing programme. The research lobotomy testing programme was begun in 1951 and terminated in 1955. The general plan was to administer, to each patient selected for lobotomy, certain prescribed tests before the operation, at 10 days following the operation, and at intervals of 5 weeks, 3 months, 6 months, and 12 months after the operation. Not all tests used were given at each testing period, but rather the prescribed test battery was somewhat different for each period. For example, the Rorschach test was given twice—before operation and one year following operation; the Draw-a-Person was given three times—before operation, 5 weeks following operation, and one year after operation; and the Colour Naming test was given at each testing period.

In all, the following test procedures were utilized: (a) Bender-Gestalt, cards 4 and 7; (b) Colour Naming test, as described in Wells and Ruesch (1945); (c) Digit Symbol sub-test of the Wechsler-Bellevue (Wechsler, 1938), either Form I or Form II; (d) Draw-a-Person; (e) Motor Inhibition (Downey, 1925; Robinson, 1946); (f) Object Memory (Wells and Ruesch, 1945); (g) Porteus Mazes (Porteus, 1950); (h) Sentence Completion; (i) Rorschach; and (j) Rorschach Concept Evaluation Technique (McReynolds, 1954).

Whenever possible standard methods of scoring were used. New developments were as follows. The Bender-Gestalt cards were scored according to the system of Pascal and Suttell (1951). Time and errors scores were both used in the Colour Naming test. In the Draw-a-Person test the patients were asked to draw a man, and these drawings were rated as "good", "fair", or "poor" by one of the authors (M.W.). The Motor Inhibition test was scored in terms of seconds required to write the phrase "United States of America" under instructions to write it as slowly as possible. In the Object Memory test the patient was asked, near the beginning of testing, to identify pictures of 10 objects. He was then asked to recall the objects (immediate memory), and was also asked to recall them at the conclusion of the testing period (delayed memory). Scores were number of objects recalled. The usual Porteus Mazes scoring did not prove feasible, and instead each subject was given a score corresponding to the highest age level at which he successfully completed a maze on any of the trials allowed. The Sentence Completion test used was developed especially for this study, and included 20 items believed to be pertinent to lobotomy. This test was scored in terms of number of completions attempted, percentage grammatically correct, percentage showing perseverations in language, and estimates of affect. The analyses of the Rorschach were somewhat more involved, and will be discussed below.

It has been noted above that during the period 1947–1954, 131 patients were given lobotomies, and that it was possible, in 1955, to collect data on degree of improvement on 125 of these. All patients given lobotomies during the period when the research psychology testing programme was in progress were referred for testing. This totalled 73 patients. Of these 73 many were unable to take certain of the tests or, for various unavoidable reasons such as illness,

trial visits, and the like, were not tested at a given prescribed period. The number of patients completing a given test at a given testing period ranged from 23 to 56.

The behaviour rating scale. In order to obtain data concerning ward behaviour of the patients, the Hospital Adjustment Scale (Ferguson, McReynolds, and Ballachey, 1953) was used. This scale consists of 90 items concerning adjustment in the hospital situation. It is filled out by a psychiatric aide familiar with a patient's behaviour. Because the scale is scored in terms of the adequacy of patient behaviour, a series of periodic Hospital Adjustment Scale scores furnishes a straightforward means of evaluating a patient's progress. The intention was that a Hospital Adjustment Scale rating should be obtained annually on each patient during the period of this study. For various practical reasons, however, it was impossible to hold precisely to this schedule. In all, one or more Hospital Adjustment Scale ratings were obtained on 98 patients.

PREDICTIVE VALIDITY OF THE PSYCHOLOGICAL TESTS

The question we are concerned with first is the extent to which the psychological tests given pre-operatively were predictive of the later psychiatric status of the patients, i.e. what is the relationship between test scores obtained before lobotomy and improvement ratings assigned a year or more after lobotomy?

As noted earlier, a total of 73 patients were seen one or more times for psychological testing. Of these, 69 were males and 4 were females. Because of the small number of females separate analyses were not carried out for each sex. Of the 73 patients, 14 had a criterion rating of 0; 23 of 1; 22 of 2; 8 of 3; and 6 of 4.

Because of great differences in the scoring systems used for the various tests it was not possible to use the same kind of comparison between pre-operative test scores and improvement ratings for all tests. Where the test scores were continuous variables which could be considered as coming from approximately normally distributed populations, the Pearson product-moment correlation coefficient was calculated. The method of comparison varied for the other tests.

The correlational technique was applicable to the following tests (the *N*s refer to number of patients tested pre-operatively on each test): Bender-Gestalt cards 4 and 7 (*N*=39), Digit Symbol (*N*=37), Object Memory Immediate and Delayed (*N*s=31 and 28), Porteus Maze with modified scoring used (*N*=33), and Rorschach Concept Evaluation Technique (for three variables *N*s=28, 23, 23). Altogether these 5 tests resulted in 8 scored variables. The coefficients of correlation between these variables and the criterion ratings were, with one exception, not significantly different from zero. This exception was a correlation of $-.42$, which is significant at the $.025$ level (*N*=28), between the *J*-score of the Rorschach Concept Evaluation Technique, and the criterion ratings.

With regard to the Colour Naming test, the number of errors was too small to permit analysis, and the time scores were too skewed to justify correlational analysis. There was no apparent relationship when the medians of time scores were computed separately for the patients obtaining different criterion ratings. With regard to the Draw-a-Person, the most appropriate statistical technique was to dichotomize both the test data and the criterion data, and to compute a tetrachoric correlation coefficient. The resulting value

did not differ significantly from zero. With regard to the Motor Inhibition test, the distribution of scores was highly skewed, so the technique was used of comparing the medians of patients obtaining the different criterion ratings. This technique failed to reveal any noticeable relationship. With regard to the Sentence Completion test comparisons of the several variables with criterion ratings failed to suggest any relationships, and detailed analyses were not performed.

With regard to the relationship between the pre-operative Rorschach tests and the criterion ratings, two analyses were performed. First, the total number of responses given and the breakdown of this number by determinants was considered. These results were converted to T-scores (Cass, 1950) for analysis. Psychograms of the mean scores were drawn separately for patients receiving each criterion rating. These psychograms did not appear to differ appreciably. The FM scores seemed to have the most widespread scatter; hence, a one-way analysis of variance was performed to test the differences among the means. The results were not significant, and accordingly, no further analyses of Rorschach determinants were undertaken.

Second, four experienced clinical psychologists were given the available pre-operative Rorschachs (N=38) for judgment. On the basis of these protocols they predicted the criterion rating each of the patients would receive. The correlations of these predictions with the actual ratings were computed; none of the coefficients approached significance.

In view of the fact that many patients were untestable before operation, it seemed possible that the very fact of testability or non-testability might itself be a predictor of improvement. Analysis of the data, however, indicated clearly that this was not the case.

Discussion. The findings of the present investigation as so far reported are, with one exception, negative. That is, the utility of the tests used to predict whether or not and how much patients would improve after lobotomy was so little as to provide no justification for the inclusion of the tests in any battery of tests designed to help select patients for operation. It should, however, be noted that all of the patients tested already had been carefully selected for lobotomy. The predictive validity of the tests might have proved significant if the tests had been used to screen patients to be considered for lobotomy. But this does not alter the general finding that the tests used in this study could not have been validly used to predict the degree of improvement of the patients operated.

The one exception to this generality was the J-score of the Rorschach Concept Evaluation Technique. This result can hardly be attributable to chance, since it happens that it was the one relationship in the whole test battery for which a specific hypothesis was formulated in the original design. The hypothesis was that the pre-operative J-score should correlate negatively with improvement after lobotomy. As noted earlier, this hypothesis was supported ($r = -.42$).

The Rorschach Concept Evaluation Technique is a procedure in which the subject is successively shown 50 areas on the Rorschach blots and asked, for each one, if it could represent some specified object. The subject answers Yes or No, and the J-score is simply the number of Yes answers he gives, translated into a T-score equivalent. The actual finding, then, was that those patients with initial low J-scores have a better chance of improving after lobotomy than those patients with initial high J-scores.

The J-score is assumed to measure the extent to which a person is rigorous

in his mental habits of conceptualization, on the one hand, or loose and undemanding, on the other. Previous work (McReynolds, 1954) has suggested that persons with cerebral organic pathology tend to have high J-scores. It was therefore a rather straightforward expectation that the effect of lobotomy—which is a physiological intrusion—would be to raise J, and that patients whose illness is manifested in a too-low J would benefit more than patients whose illness is manifested in a too-high J.

One of the authors of this report (McReynolds, 1956) has proposed a theory of anxiety, in which it is proposed that anxiety results from a large quantity of unassimilated perceptual material. Since assimilation can be viewed as a process of conceptualization, it follows that any procedure which would facilitate conceptualization, by decreasing the rigorousness of one's conceptual processes, might relieve anxiety. Hence lobotomy, which according to the evidence reported here, results in such a decrease in conceptual rigour, could be expected to relieve anxiety, as is indicated in the Columbia-Greystone Study (Mettler, 1949).

PSYCHOLOGICAL AND BEHAVIOURAL CHANGES FOLLOWING LOBOTOMY

Test changes over time. As noted earlier, the general plan of the present investigation called for giving the same test, or different forms of the same test, to the same patients at different predetermined times following lobotomy. The purpose of this rationale was to obtain data which could be used to assay test changes following operation, in order to bear upon the question of the long-term effects of lobotomy on various psychological functions. Owing to the fact that many patients, on any given test, were often untestable—or for various unavoidable reasons were not tested, the number of cases on whom successive testings on the same tests were available was quite small. However, for most of the tests the number of patients tested at each scheduled testing period was sufficient to indicate trends. The point here is that while the numbers of patients tested at each scheduled period were for the most part satisfactory, these numbers were not comprised of the same patients throughout all testings. Consequently, statistical analyses to show significances of trends would have been unjustified. Such trends in test scores as appeared following lobotomy, then, are to be interpreted as suggestive rather than demonstrative, and reflect cross-sectional rather than longitudinal analyses.

The post-operative test trends may now be noted. With regard to the Bender-Gestalt, cards 4 and 7, (Ns varied from 39 to 53) there was a marked decrease in performance from the pre-operative testing to the 10th day after operation, and then a gradual increase till the last testing, 12 months after operation. While the 12th month performance was better than the pre-operative performance, we are not able to state to what extent this may have been due to practice effects.

With regard to the Rorschach Concept Evaluation Technique the J score (number concepts reported seen) increased markedly in the 10 days following operation, and after a year still has not returned to the pre-operative level (Ns varied from 28 to 48).

On the Colour Naming test, the Motor Inhibition test, and the Draw-a-Person test the trend analyses indicated practically no changes over time, and no discernible trends. In the case of the Porteus Mazes insufficient post-operative data were available for analysis, and in the case of the Sentence Completion the available data did not justify analysis. This leaves three tests

to be considered—the Digit Symbol test, the Object Memory test, and the Rorschach test.

In the Digit Symbol test (Ns varied from 37 to 56) there was a marked decrement 10 days following operation, and then a gradual increase—beyond the pre-operative level—up till the last testing one year after operation. Though the use of statistical tests of significance would have been meaningless here, as noted earlier, inspection of the data indicates that the changes on this test were among the most dramatic found in this study. On the Object Memory test (Ns varied from 29 to 53) there was again a marked decline 10 days following surgery, and then a notable improvement to above the pre-operative level, this improvement apparently reaching its maximum about 6 months after lobotomy. On the Rorschach test, psychograms of mean T-scores were compiled for the pre-operative examination (N=40) and for the examination 12 months following operation (N=42). These psychograms were extremely similar, and it was quite clear, from inspection of the data, that they did not differ to any appreciable degree.

Behavioural changes over time. The Hospital Adjustment Scale was used to evaluate behavioural changes, such as might be observed in patients' ward activities, but which might not be measured on psychological tests. Since both the Hospital Adjustment Scale and the criterion ratings provided estimates of patients' overall psychiatric status, the correlation between the two was computed. Because the criterion ratings were obtained on all patients at the same time, whereas the Hospital Adjustment Scales were filled out periodically by aides, a time factor entered. Eighty-five cases were obtained on whom both Hospital Adjustment Scales and criterion ratings were available not more than one year apart. For these 85 cases the correlation between criterion rating and Hospital Adjustment Scale was .52. This correlation, though significant at the .01 level, probably underestimates the true value, due to the time disparities in the two measures.

Certain suggestive implications concerning behavioural changes over time following lobotomy can be drawn from Hospital Adjustment Scale data. Scores were available on 14 patients before operation, 28 approximately one year after operation, 35 approximately 2 years after operation, and 23 approximately 4 years after operation. For the pre-operative measure, the mean raw score was 32.7, which is equivalent to the 21st percentile for hospitalized psychiatric patients in general, and which supports the earlier statement that the patients operated comprised an extremely ill group. One year after operation the mean raw score was 59.7, which is equivalent to the 46th percentile. After 2 years the mean raw score was 58.6, equivalent to the 45th percentile; after 3 years 56.0, equivalent to the 42nd percentile; and after 4 years 50.4, equivalent to the 37th percentile. Because the patients represented in these successive samples are to a large extent different, statistical analyses for significance of trends would not be justified. The suggestive general picture, however, is one of marked behavioural improvement in the first year following lobotomy, followed by a gradual decrement during the next three years.

Discussion. The results of the part of our study concerning changes resulting from lobotomy are best considered as suggestive rather than as demonstrative. With this proviso, the data may be examined for their general implications.

In the first place, it is noteworthy that most of the tests show a decrement in performance immediately after surgery—as reflected by testings 10 days after operation. This tendency probably is a function of the physiological trauma

occasioned by the surgery itself; at this stage the patient is, primarily, an "organic" patient. The test scores which most prominently appear to represent continuing, substantial changes after lobotomy are the Bender-Gestalt, Digit Symbol, and Object Memory, particularly the last two. In each case the change is in the direction of improved performance, and appears to have levelled off by the end of the first year after lobotomy.

These general conclusions are similar to those reported by Scherer, Winne, Clancy and Baker (1953, 1955), who interpret their data to indicate that performance on tests measuring mental efficiency and organicity drop sharply during the first two-week post-operative period, then rise to reach a peak at about three months after surgery, and then gradually decline. Our test results in general suggest increased mental efficiency and improved performance on retention tasks after the immediate effects of the operation have subsided. The one trend which cannot be fitted into this pattern is the J-score on the Rorschach Concept Evaluation Technique, which appears to reflect, rather, a persisting "organic-like" defect. As noted earlier, this trend may reflect a lessened anxiety level. If so, the apparent improvements in retentive and attentive capacities—as reflected in the Object Memory and Digit Symbol tests—may be due to lessened anxiety rather than to any effects of the surgery on these functions *per se*. Indeed, we would be very hesitant to suppose that prefrontal lobotomy has any *direct* beneficial effects on memory capacities.

The tests used, except for the Rorschach, were not particularly appropriate for evaluating changes in overall personality structure. The fact that no notable Rorschach changes occurred suggests that lobotomy did not effect any overall changes in personality structure.

The Hospital Adjustment Scale trend suggests an improved level of behavioural adjustment to the hospital ward living situation. In fact, the improvement indicated is perhaps greater than would have been expected on the basis of changes in performance on those tests used in this study.

SUMMARY

In 1951 a research programme designed to evaluate the effects of pre-frontal lobotomy by means of psychological instruments was inaugurated at the Palo Alto Veterans Administration Hospital. Until the project was terminated in 1955, 73 patients were seen one or more times for testing, and behavioural ratings were obtained on 98 patients. The major findings of the study were: (a) Score of one variable (J) of the Rorschach Concept Evaluation Technique given pre-operatively correlated significantly with rated clinical status of the patients a year or more after operation; other tests analysed failed to show any significant correlations; (b) after operation there was a tendency for test scores reflecting attentive capacities to decline, then to rise slowly to beyond the pre-operative level; these improved functions are interpreted as possibly being due to a decrement in anxiety level; and (c) behavioural adjustment scores tended to rise, up to one year post-operative, and then to decline slowly.

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ADRENAL LIPOIDS AS SEEN POST MORTEM IN SCHIZOPHRENIA

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DURING an investigation of the morbid anatomy of pituitary and adrenal glands of an unselected series of mental hospital patients (1), it was noted that adrenal sudanophilic material and birefringence were reduced in many cases of schizophrenia. It was therefore decided to make a statistical study of such cases in order to determine if any significance could be attached to the findings and if so, to consider how the facts might be related to present knowledge of schizophrenia.

The adrenal glands were treated as described in our previous paper and the birefringent material seen microscopically under the conditions specified was classified in two grades, No. 1, nil or scanty, and No. 2, moderate or excessive. The term "adrenal lipid" in this paper refers to birefringent material stainable with Sudan IV. Forty-one cases of schizophrenia were compared with a group of 287 cases of other mental diseases and an obvious deficiency of adrenal lipoids was found in the schizophrenic group (see Table I).

TABLE I
Adrenal Lipoids in Schizophrenia and Other Mental Diseases

				Adrenal Lipoids		
				Grade 1	Grade 2	Total
Schizophrenia	30	(73%)		11	(27%)	41 (100%)
Other mental illness	122	(43%)		165	(57%)	287 (100%)
Total	152			176		328

As the age and sex distribution of cases with schizophrenia differed considerably from those with other mental diseases, and in addition there was some evidence that liver damage was more common among schizophrenics, it was decided to take a sample of cases which had been paired for age, sex and liver damage, but otherwise selected at random. The constitution of this sample is shown in Table II. Table III shows that adrenal lipoids were found

TABLE II

Constitution of Sample Paired for Age, Sex and Liver Damage

Age				Males		Females	
<40	..	..	..	2		2	(1 with moderate liver damage)
40-	..	..	..	0		6	
50-	..	..	..	2	(1 with moderate liver damage)	6	
60-	..	..	..	4	(1 with moderate liver damage)	6	
70-	..	..	..	1	(1 with moderate liver damage)	4	(1 with moderate liver damage)
80 and over	..	..	..	0		3	
				9	(3 with moderate liver damage)	27	(2 with moderate liver damage)

TABLE III

Comparison of Amount of Adrenal Lipoids in Schizophrenia and Other Mental Illness (Paired Sample)

				Adrenal Lipoids		Total
				Grade 1	Grade 2	
Schizophrenia	..	..		26	10	36
Other mental illness	..	..		16	20	36
Total..	..	..		42	30	72

$$\chi^2 = 5.714, \quad n=1, \quad .02 > P > .01.$$

to be significantly less in the schizophrenic group when compared with the group with other mental illness. Because of the relationship of adrenal lipoids with the presence or absence of hypertension shown in our previous paper, we compared the incidence of hypertension in the schizophrenic and other mental illness groups (see Table IV) and found that hypertension was not likely to be responsible for the differences in lipid content in the two groups.

TABLE IV

Incidence of Hypertension in Schizophrenia and in Other Mental Illness (Paired Sample)

				Hypertensive	Non-Hypertensive	Total
Schizophrenia	..	..		8	28	36
Other mental illness	..	..		9	27	36
Total..	..	..		17	55	72

$$\chi^2 = .083, \quad n=1, \quad .8 > P > .7.$$

In addition to the apparent relationship between schizophrenia and adrenal lipoids, it was noticed that liver damage also appeared to be present more often in cases with a relative deficiency of adrenal lipoids. This is shown in Tables V and VI. Here the schizophrenic and non-schizophrenic groups

TABLE V
Schizophrenia

Comparison of Amount of Adrenal Lipoids and Liver Damage (All Cases)

				Adrenal Lipoids		Total
				Grade 1	Grade 2	
Liver damage	..	..		9	0	9
No liver damage	..	..		21	11	32
Total	..	..	..	30	11	41

P (by Fisher's exact method) = .04.

TABLE VI
Other Mental Illness

Comparisons of Amount of Adrenal Lipoids and Liver Damage (All Cases)

				Adrenal Lipoids		Total
				Grade 1	Grade 2	
Liver damage	..	..		18	11	29
No liver damage	..	..		104	154	258
Total	..	..	..	122	165	287

$\chi^2 = 5.050$. $n = 1$. $.05 > P > .02$.

are treated separately and in both cases the difference is just significant at the level of $P < .05$. Moreover, liver damage was found more often in schizophrenic patients (see Table VII).

TABLE VII
Liver Damage in Schizophrenia and Other Mental Illness

				Liver Damage		Total
				Nil	Some	
Schizophrenia	..	..		32	9	41
Other mental illness	..	..		258	29	287
Total	..	..	..	290	38	328

$\chi^2 = 4.915$. $n = 1$. $.05 > P > .02$.

It was noted that the nature of the liver damage was extremely variable and included conditions such as fatty degeneration, cirrhosis and extensive metastases, and in all cases showing maximal liver destruction lipoids were completely absent. Owing to the differences in age and sex composition referred to earlier, it was decided to examine a second sample paired for age, sex and adrenal lipoids and compare the numbers of cases with liver damage in the schizophrenic and non-schizophrenic groups. The constitution of this sample is shown in Table VIII and the comparison of these two mental groups in Table IX. The difference was not significant. The nature of the liver damage and the cause of death in these cases included in the second sample is shown in Table X and it will be seen that there is no consistent cause of liver damage. It would appear, therefore, that the relative deficiency of adrenal lipoids seen in schizophrenia is more likely to be a determining factor in a higher incidence of liver damage in this disease than the reverse. If, in fact, there is a relationship between these two factors, it appears probable that their interdependence might

TABLE VIII
Sample Paired for Age, Sex and Amount of Adrenal Lipoids

Age							Males	Females
<40	..	..	..	..	..	..	1 (1)	3 (1)
40-	..	..	..	..	..	..	2 (0)	6 (0)
50-	..	..	..	..	..	..	2 (0)	6 (2)
60-	..	..	..	..	..	..	4 (1)	6 (3)
70-	..	..	..	..	..	..	1 (1)	4 (2)
80 and over	..	..	..	..	..	..	0	3 (1)
							10 (3)	28 (9)

Figures in brackets represent the number of cases in each sample with excessive adrenal lipoids.

TABLE IX
Comparison of Liver Damage in Schizophrenia and Other Mental Illness (Paired Sample)

				No Liver Damage	Moderate or Severe Liver Damage	Total
Schizophrenia	..	..	..	29	9	38
Other mental illness	..	..	..	33	5	38
Total	..	..	..	62	14	76

$\chi^2 = 1.329$ (using Yates' correction). $n = 1.$ $.3 > P > .2.$

TABLE X
Type of Liver Damage and Cause of Death in Cases with Liver Damage in the Paired Sample (see Table VIII)

Mental Diagnosis	Age	Sex	Type of Liver Damage	Cause of Death
Schizophrenia	.. 43	M	Malignant metastases	Mediastinal sarcoma
Schizophrenia	.. 49	M	Multilobular cirrhosis	Pulmonary tuberculosis
Schizophrenia	.. 52	M	Multilobular cirrhosis	Pulmonary tuberculosis
Schizophrenia	.. 60	M	Multilobular cirrhosis	Cirrhosis of liver
Schizophrenia	.. 79	M	Fatty degeneration	Bronchopneumonia, pyelonephritis, diabetes
Schizophrenia	.. 28	F	Fatty degeneration	Renal failure following insulin coma
Schizophrenia	.. 33	F	Malignant metastases	Carcinomatosis, carcinoma breast
Schizophrenia	.. 49	F	Fatty degeneration	Aspiration pneumonia
Schizophrenia	.. 78	F	Cholangitis	Toxaemia due to pyaemia
G.P.I.	.. 38	M	Early intralobular cirrhosis	Bronchopneumonia
Organic dementia	58	M	Fatty degeneration	Lateral sinus thrombosis
Depression	62	M	Malignant metastases	Bronchopneumonia, glandular sarcomatosis
Chronic mania	.. 67	M	Obstructive jaundice	Carcinoma head of pancreas
Alcoholic psychosis	67	M	Cirrhosis (multilobular)	Coronary thrombosis

result in the establishment of a vicious circle. The complete absence of sudanophilic staining and birefringence in all cases where maximal destruction of liver cells was seen was very striking. However, as the latter were entirely unselected cases and the numbers were few, 10 in all, a detailed study was not carried out.

The schizophrenic cases were subdivided into paraphrenics and schizophrenics and examined in relation to their adrenal lipoids but no significant difference was found (see Table XI). The other mental illness group was also subdivided as in Table XII and no significant difference was found between the groups in the amount of lipoids present.

TABLE XI

Comparison of Amount of Adrenal Lipoids in Schizophrenia and Paraphrenia

				Adrenal Lipoids		Total
				Grade 1	Grade 2	
Schizophrenia	..	..	..	25	8	33
Paraphrenia	..	..	..	5	3	8
Total				30	11	41

 $\chi^2=0.854$ (using Yates' correction). $n=1$. $\cdot 5>P>\cdot 3$.

TABLE XII

Comparison of Amount of Adrenal Lipoids in Various Types of Non-Schizophrenic Mental Illness

				Adrenal Lipoids		Total
				Grade 1	Grade 2	
Paranoid psychosis	..	..	..	16	19	35
Manic-depressive psychosis	..	..	..	17	22	39
Cerebral arteriosclerosis ..	..	..	..	42	66	108
Others	..	..	..	47	58	105
				122	165	287

 $\chi^2=\cdot 963$. $n=3$. $\cdot 9>P>\cdot 8$.

DISCUSSION

The biochemical aspects of schizophrenia have been recently reviewed by Richter (2) and Smythies (3) and endocrine changes have been assessed by Sands (4). Deviations from normal have been found by many investigators but, apart from a wide range in variation as compared with normal, the findings have often been conflicting. In connection with ketosteroid excretion, Reiss (5) has emphasized the marked variation from day to day, which shows fluctuations amounting to 200 per cent. in schizophrenia. Our results show an apparent relationship between schizophrenia and adrenal lipoids, which would appear on histological grounds to be a relative deficiency of lipoids when compared with other mental diseases.

As a similar tendency was seen in cases of liver damage irrespective of the mental disease or the nature of the damage, the conclusion was reached that liver tissue may be more vulnerable to agents of disease when adrenal lipoids are deficient. This might also explain the greater numbers of diseased livers in schizophrenics than in other mental diseases, though here the numbers were too small to be conclusive. Factors which indicate a disturbance of adrenal steroids in liver diseases are the increased secretion of aldosterone in hepatic cirrhosis (6) and (7) and the low concentration of 17-ketosteroids in severe liver disease (8) and (9). On the basis of poor eosinophil response to epinephrine in patients with portal cirrhosis, Finestone and Shuman (10) concluded that there was inadequate adrenal function in this disease state. In a series of autopsies on cases of alcoholic cirrhosis, Lloyd and William (11) found decreased lipoids in the adrenal cortex. Our work confirms this finding whilst relating it to damaged liver tissue resulting from a variety of diseases, and suggesting a lowered resistance to agents of disease due to a defect in adrenal steroid metabolism.

Over the years, much work has been carried out on liver function in schizophrenia, often with conflicting results. Richter (12) in his review of the

subject concludes that some impairment of liver function is commonly present in schizophrenics as a group but may be related to different enzyme systems being affected to different degrees and that this is probably not a primary factor in the aetiology of the disease. Following insulin coma therapy the prognosis of schizophrenia was found to be good when high urinary keto-steroids are reduced and maintained at a steady level as compared with those which show continuing fluctuations (13). In this connection, the formation of protein-steroid complexes by the liver (14) might possibly be a factor of importance in maintaining this steady level, especially as the conversion of adrenal steroid compounds into the 17-keto state is now generally considered to be a function of the liver (15).

One modern concept of schizophrenia postulated by Osmond and Smythies (16) and recently reviewed by Smythies (3) supposes the mental and biochemical changes to be the result of a toxic metabolite, a so-called M substance having mescaline-like qualities. It is thought that in certain predisposed individuals the production of M substance, which is probably an oxidative metabolite of adrenaline, possibly adrenochrome or closely related substance, is activated by stress and maintained by the stress thus produced. It seems possible that should such a metabolite interfere with normal steroid metabolism, then the adrenal glands would suffer first and the resistance of the liver to disease agents might be lowered, especially if protein-steroid complexes normally formed or stored in the liver were disturbed.

SUMMARY

1. The histology of adrenal glands in schizophrenics was examined post mortem and absence or deficiency of adrenal lipid staining was found to be significantly greater than in a mixed group of other mental diseases.
2. Cases with liver damage also showed a similar deficiency and this was found to be just significant.
3. The schizophrenic group contained more cases of liver damage than the control group but when paired for age, sex and adrenal lipoids the findings were not significant.
4. It was concluded that disturbance in adrenal steroid metabolism was often present in schizophrenia to a significant degree. That such disturbance might render the liver more vulnerable to agents of disease was suggested, but in this connection numbers were insufficient to be conclusive.

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CLINICAL SYNDROMES IN DEPRESSIVE STATES

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INTRODUCTION

THE value of a rating scale for assessment in psychiatric disorders is that it facilitates the investigation of patterns of symptoms and their response to treatments. In a previous paper, Hamilton (1959), describing the construction and use of a rating scale designed for assessing the condition of patients suffering from depressive disorders, certain findings were described. In brief, it was found that much of the information given by the 17 variables of the rating scale could be given by four "index numbers" (dimensions, or factors). The nature of these factors was determined in two ways. In the first, the weights given to the symptoms which constituted the factors were examined. It was found (Table I) that the highest weights in the first factor were given to Depressed Mood, Guilt, Retardation, Loss of Insight, Suicide and Loss of Interest, in descending order. On this basis it was decided that the first factor corresponded to the classical clinical description of Retarded Depression. Examination of the weights given to the symptoms in the second, third and fourth factors, showed that these factors had no obvious correspondence with clinical syndromes.

TABLE I
Factor Saturation of Rating Scale for Depression

			Factor 1	Factor 2	Factor 3	Factor 4
1. Depressed mood	..	..	·76	—·17	·10	·15
2. Guilt	..	..	·73	—·16	·34	—·14
3. Suicide	..	..	·53	—·31	·28	·12
4. Insomnia (initial)	..	..	·21	·61	—·21	—·03
5. Insomnia (middle)	..	..	·28	·36	—·08	·64
6. Insomnia (delayed)	..	..	·34	·37	—·30	—·34
7. Work and interests	..	..	·46	·27	·04	—·13
8. Retardation	..	..	·68	—·37	—·25	·22
9. Agitation	..	..	—·03	·54	·50	—·03
10. Anxiety (psychic)	..	..	—·37	·33	·56	·07
11. Anxiety (somatic)	..	..	—·40	·25	·48	·42
12. Gastro-intestinal symptoms	..	..	·28	·67	—·39	—·01
13. General somatic symptoms	..	..	·09	·24	—·36	·63
14. Genital symptoms (loss of libido)	..	..	·47	—·14	·40	·23
15. Hypochondriasis	..	..	·16	·37	·12	—·14
16. Loss of insight	..	..	·60	·11	·20	—·17
17. Loss of weight	..	..	·35	·44	·21	—·19

By calculating the appropriate weighted sums of scores on symptoms for each patient, we can obtain his factor scores. These scores are designed to have a mean of 50 and a standard deviation of 10, in the original group of patients. They are independent of each other, i.e. over the whole group of patients, the correlations between the four factors are zero. The second method of determining the nature of the factors was based on an examination of the factor scores. It was found that patients with Retarded Depression had high scores on the first factor, thus confirming the finding by the previous method. Those with high scores on the second factor showed fairly typical Agitated Depression. Those with high scores on the third factor had no obvious resemblance clinically, as they showed the usual syndromes of Retarded or Agitated Depression. It was then found that, of all the factors, the third had the highest correlation with outcome after treatment. The patients who had high scores on the fourth factor, while showing nothing obvious about their symptoms, did quite clearly have abnormal and erratic personalities. It was suggested that the fourth factor corresponded to some sort of "psychopathic depression".

The accumulation of further data has provided the opportunity to check the first findings and to go further into the questions raised by them.

CLASSIFICATION OF DEPRESSIONS

Depressive states have for long been classified by various dichotomies into Reactive versus Endogenous (the latter usually considered to correspond with Manic-Depressive Depression), Agitated versus Retarded, and Neurotic versus Psychotic. The last of these we consider pointless and shall not discuss further, on two grounds: the first is that, as often used, it seems to mean little more than the difference between mild and severe depressions; and the second is that whereas the distinction between neurotic and psychotic may have some empirical value in classifying different disorders, it is a distinction of little value within one disorder. The reactive-endogenous dichotomy is an aetiological classification, whereas the agitated-retarded division is a symptomatological one. It is generally considered that the two classifications correspond fairly closely. (The intrusion of a third type, Involutional Depression, is ignored here.)

Retarded and Agitated Depressions

It is always possible to find patients whose symptoms demonstrate clearly the great difference between these types of depression; but clearly, this method, although of heuristic value, does not lead very far by itself. Examination of the correlations between the relevant symptoms is better, since the correlations express the relationship between the symptoms in all patients. It was found that Depressed Mood, Guilt, Suicide and Retardation, all intercorrelated positively, with an average intercorrelation of about .45. Agitation, Anxiety (Psychic) and Anxiety (Somatic) also intercorrelated positively, with an average of about .32; but the two groups intercorrelated negatively, the average being about -.18.

Endogenous and Reactive Depressions

The various theories about this classification may be considered briefly along the following lines. The first hypothesis is that there is no fundamental

difference between these two types. Any difference found is of no greater significance than is the different distribution of spots from one case of smallpox to another. The alternative hypothesis is that there is a difference, and this may be either that the difference is merely quantitative, i.e. that reactive and endogenous correspond to mild and severe; or that the difference is qualitative, showing different symptoms. The last one is simply another way of stating that the aetiological and symptomatological classifications correspond.

These various hypotheses were treated by the following methods. The 64 patients studied were classified into four groups: those with no precipitating (psychological) factors, the Endogenous group (E); those with obvious precipitating factors, the Reactive group (R); the doubtfully endogenous (DE) and the doubtfully reactive (DR). The groups numbered E 11, DE 12, DR 15, and R 26. Such clinical decisions can be very difficult, hence the division into four groups. In any case, errors will tend to hide positive findings.

Is there any difference between the groups? The difference between the means of the groups on total crude score, and the four factor scores were examined (see Table II). It will be seen that for the total crude score on the rating scale, the differences are very highly significant, group E having a mean of 54.4, and group R having a mean of 39.4. This means that, clinically, group E is more ill than group R. It is satisfying that the intermediate groups have intermediate means.

TABLE II
Scores for Four Clinical Groups

Clinical Syndromes	Endogenous	Doubtful Endogenous	Doubtful Reactive	Reactive	F Ratio	P
Number in group	11	12	15	26		
<i>Scores on rating scale:</i>						
Group means	54.4	46.8	46.5	39.4	7.19	< .001
Group totals	598	561	697	1,024		
Sum of squares	33,186	27,595	33,687	42,140		
<i>Scores on first factor:</i>						
Group means	58.2	52.1	50.9	43.7	8.54	< .001
Group totals	640	625	764	1,137		
Sum of squares	38,072	33,589	40,340	50,651		
<i>Scores on second factor:</i>						
Group means	53.5	51.2	53.1	49.6	<1	Not significant
Group totals	588	614	797	1,290		
Sum of squares	32,124	32,592	44,457	66,594		
<i>Scores on third factor:</i>						
Group means	50.2	53.0	47.1	52.6	1.23	Not significant
Group totals	552	636	707	1,367		
Sum of squares	30,052	34,952	34,117	73,095		
<i>Scores on fourth factor:</i>						
Group means	53.9	48.5	50.9	51.2	<1	Not significant
Group totals	593	582	763	1,330		
Sum of squares	32,445	28,856	39,759	71,216		

Scores on the first factor are a more subtle form of total score, since they take into account the correlations and standard deviations of the variables. The results show that on the first factor, group E has a mean of 59.2 and group R of 43.7. The intermediate groups again have intermediate scores. These differences are very highly significant statistically. The constitution of the first factor suggested that it was a measure of retarded depression, and the present finding confirms the clinical opinion that endogenous depression tends to be of the retarded type. Differences between the means on the second, third and fourth factors are not significant. The conclusion from this is that none of these three factors can be regarded as measuring the difference between endogenous and reactive depressions.

Accepting the finding that the two types of depression differ, there are then two theories about the difference. One theory states that the two types are extremes of a single population, and the other states that they are two distinct, but overlapping populations. In statistical terms, this would be put in the form that the first theory would suggest a unimodal distribution of scores, and the second a bimodal distribution. Table III shows the distribution of scores and compares them with a Gaussian (normal) distribution. The χ^2 test shows that the distributions do not differ significantly from the unimodal Gaussian distribution, and this is in agreement with the first theory. Nevertheless, the distribution of scores on the first factor does show two "humps", and the resemblance to a normal distribution is not very good. Since there are only 11 endogenous cases out of a total of 64, a clear-cut bimodal distribution would be found only if the two types differed considerably. The fact that clinicians disagree on this question clearly indicates that the difference, if any, is not great. Perhaps it would be better to withhold judgment at the moment.

TABLE III
Distribution of Scores for 64 Patients

	Below $1\frac{1}{2}$ S.D.	Down to $-1\frac{1}{2}$ S.D.	Down to -1 S.D.	Down to $-\frac{1}{2}$ S.D.	Up to $\frac{1}{2}$ S.D.	Up to 1 S.D.	Up to $1\frac{1}{2}$ S.D.	Beyond $1\frac{1}{2}$ S.D.	Total No.	χ^2	P
Gaussian distribution	4.27	5.88	9.59	12.26	12.26	9.59	5.88	4.27	64.02	—	—
Total scores ..	5	5	8	14	13	8	8	3	64	2.22	.9
F ¹ scores ..	4	8	6	18	12	3	8	5	64	10.23	.1
F ² scores ..	4	9	8	7	12	13	8	3	64	6.55	.4
F ³ scores ..	3	4	13	12	16	7	5	4	64	4.21	.7
F ⁴ scores ..	5	4	10	11	14	14	3	3	64	4.94	.6

PATTERNS OF SYMPTOMS

The differences between the four clinical groups can be considered in more detail by examining the individual symptoms (variables). Table IV gives the details for those symptoms that show statistically significant differences. It will be seen that group E scores more highly than group R in Depressed Mood, Guilt, Suicide, Insomnia (Delayed), Retardation and Loss of Insight. This is obviously in agreement with the clinical experience of those who accept the qualitative difference between the two depressions. These results also show a good correspondence with the saturations of the first factor. An exact correspondence cannot be expected, because these tests of significance are not independent, owing to the correlations between the variables, whereas the factor saturations have taken these correlations into account.

Whichever way the data are examined, the picture of Retarded Depression comes out clearly, and its association with the absence of external (psychological) precipitation has also been demonstrated. On the other hand, the syndrome of Agitated (or Anxious) Depression is conspicuous by its absence. The means for Agitation are: for group E 1.5, for group DE 1.4, for group DR 1.5 and for group R 1.5; for Anxiety (Somatic) the means are 3.1, 3.1, 2.7 and 3.3 respectively; and for Anxiety (Psychic) the means are 2.8, 3.7, 2.9 and 3.7 respectively. The means do not differ for Agitation and Anxiety (Somatic), (the F ratio is less than one), and although group R has a higher score on Anxiety (Psychic) than group E, the intermediate groups do not

show appropriately intermediate scores; in any case, the differences are not significant ($F=1.60$, $P=.20$).

It would be mistaken to draw from the data the conclusion that the syndrome of anxious (agitated) depression does not exist, and that reactive depressives do not show this syndrome. The evidence clearly shows that patients who develop a depressive illness in response to stress do not have the typical symptoms of retarded depression. The absence of a positive finding merely means that it would be advisable to accumulate more cases. For a sufficient number it would be useful, for the statistical test, to calculate a discriminant function.

TABLE IV
Scores for Four Clinical Groups

			Endo- genous	Doubtful Endo- genous	Re- active	Re- active	F Ratio	P
Number in group	..	..	11	12	15	26		
<i>Depressed Mood:</i>								
Group means	..	..	5.6	5.2	5.5	4.8	3.00	< .05
Group totals	..	..	62	63	72	124		
Sums of squares	..	..	356	341	360	608		
<i>Guilt:</i>								
Group means	..	..	3.5	3.4	2.4	1.7	3.55	< .05
Group totals	..	..	39	41	36	44		
Sums of squares	..	..	219	179	124	138		
<i>Suicide:</i>								
Group means	..	..	5.5	3.2	4.0	3.5	2.92	< .05
Group totals	..	..	60	38	52	92		
Sums of squares	..	..	362	184	268	402		
<i>Insomnia (delayed):</i>								
Group means	..	..	3.5	3.2	4.1	2.5	4.47	< .01
Group totals	..	..	39	38	53	54		
Sums of squares	..	..	145	138	203	202		
<i>Retardation:</i>								
Group means	..	..	2.6	1.8	2.4	0.7	5.82	< .01
Group totals	..	..	29	22	36	17		
Sums of squares	..	..	111	66	158	35		
<i>Loss of Insight:</i>								
Group means	..	..	0.9	1.4	0.5	0.2	4.82	< .01
Group totals	..	..	10	17	8	5		
Sums of squares	..	..	26	43	18	7		

"PSYCHOPATHIC" DEPRESSION

Following the suggestion from the original analysis of the rating scale, that high scores in factor 4 were associated with abnormal personality, the 64 patients in this enquiry were then separated into a group of 8 who showed such personality (see Appendix 2), and the rest. The means of total score on the rating scale and the first three factors showed no significant differences between the two groups, but on factor 4 the special group score was significantly higher, with a mean of 58.2 against 50.0 (Table V). The original suggestion that a high score on factor 4 is associated with an abnormal personality, is thereby confirmed despite the small size of the group.

TABLE V
Comparison of "Psychopathic" and Non-Psychopathic Groups

		"Psycho- pathic" Depressives	Other Depressives	F	P
Number in group	..	8	56		
<i>Total Score on Scale:</i>					
Group means	..	38.6	45.9	3.47	< .10
Group totals	..	309	2,571		
Sums of squares	..	12,945	123,663		
<i>Scores on Factor 1:</i>					
Group means	..	44.2	50.2	2.67	Not significant
Group totals	..	354	2,812		
Sums of squares	..	16,044	146,608		
<i>Scores on Factor 2:</i>					
Group means	..	46.6	52.1	1.97	Not significant
Group totals	..	373	2,916		
Sums of squares	..	18,019	157,748		
<i>Scores on Factor 3:</i>					
Group means	..	52.4	50.8	<1	Not significant
Group totals	..	419	2,843		
Sums of squares	..	22,497	149,719		
<i>Scores on Factor 4:</i>					
Group means	..	58.2	50.0	5.94	< .05
Group totals	..	466	2,802		
Sums of squares	..	27,836	144,440		

TABLE VI
Comparison of Symptoms in "Psychopathic" and Non-Psychopathic Groups

		"Psycho- pathic" Depressives	Other Depressives	F	P
Number in group	..	8	56		
<i>Guilt:</i>					
Group means	..	0.9	2.7	6.35	< .05
Group totals	..	7	153		
Sum of squares	..	21	639		
<i>Insomnia (delayed):</i>					
Group means	..	1.0	3.1	15.71	< .001
Group totals	..	9	176		
Sum of squares	..	32	656		
<i>Work and Interests:</i>					
Group means	..	3.8	5.8	11.14	< .01
Group totals	..	30	325		
Sum of squares	..	146	2,017		
<i>Gastro-Intestinal (symptoms)</i>					
Group means	..	1.2	2.4	4.09	< .05
Group totals	..	10	135		
Sum of squares	..	22	459		
<i>Loss of Weight:</i>					
Group means	..	1.5	2.9	4.19	< .05
Group totals	..	12	160		
Sum of squares	..	48	618		
<i>Age:</i>					
Group means	..	35.4	53.1	16.38	< .001
Group totals	..	283	2,977		
Sum of squares	..	10,991	165,661		

Turning now to the individual symptoms (Table VI), we see that these patients score significantly less than the others in Guilt, Insomnia (Delayed), Loss of Interest and Working Capacity, Gastro-Intestinal symptoms and Loss of Weight. They are also very significantly younger. The saturations of these five variables in factor 4 are all negative, as is to be expected. (In calculating factor scores, variables are scored as deviations from the mean, i.e. low scores appear as negative numbers. A negative weight therefore increases the factor score.) The correspondence between factor saturations and differences between means is not very close. Although the above five variables show the greatest differences between means, their factor saturations are not high. Insomnia (Middle) and Loss of Libido show the highest saturations, but the differences between means are negligible (F ratio less than one), although in the right direction.

DISCUSSION

The value of these findings depends in the first place on the ratings. These should not only be accurate and reliable, but also meaningful: a subtle problem which can cause considerable difficulty. (For example, ratings on the quality of "individuation" would not be meaningful to those who do not accept Jungian theories). Concerning accuracy and reliability, every effort has been made to make these as good as possible, by using the ratings from two physicians and utilizing all information available (Hamilton, 1959).

In the second place, and very fundamentally, the value depends on the adequacy of the classification of the patients into separate groups. It has already been mentioned that if the classification is inadequate, it will tend to obscure differences between groups. For this reason, positive findings are more trustworthy than negative ones. The classification of patients is illustrated in Appendix 1, which contains three brief typical case histories in each of groups DE, DR, R and, since a negative is difficult to prove, only one history in group E. Appendix 2 contains more detailed case histories of all the eight patients in the "psychopathic" group.

The classification on an aetiological basis, into endogenous and reactive depressions, does not imply that there is a sharp distinction between these two categories. The provision of two extra groups, the doubtful endogenous and doubtful reactive, clearly demonstrate our viewpoint on this. We believe that the development of quantitative techniques and of genetics will cast further light on this problem.

The absence of evidence for the existence of a syndrome of Anxious (Agitated) Depression, in marked contrast with the evidence for Endogenous-Retarded Depression, requires some comment. In our opinion this is because the "Reactive" group contains more than one symptomatological syndrome. It is noteworthy that all of the "psychopathic" group are to be found in the reactive group except one (Case No. 10 in group E). This is significant both clinically and statistically. Omission of these 8 patients decreases the mean score of group E on Agitation, Anxiety (Psychic) and Anxiety (Somatic) and increases the means for group R, i.e. in the direction to be expected, although the change is too small to make a difference to the statistical test.

It was mentioned above that the simplicity of dichotomous classifications of depressions was disturbed by the intrusion of a third type: Involutional Depression. It is this type which is usually associated with much anxiety and agitation, and also is generally considered to be more frequent in women. Since

this investigation dealt with male patients only, this would account for the absence of a distinct group of patients with marked anxiety and agitation and of the corresponding syndrome, provided such patients were included in the reactive group.

No attempt has been made here to review the literature on endogenous and reactive depressions. This has already been done extremely well on a number of occasions and the general conclusions are to be found in the standard textbooks. When it comes to "Psychopathic" depression, however, the reverse is true. An examination of the literature (probably inadequate, but the best we could do) has not revealed any specific reference to a syndrome of depression occurring in abnormal personalities, differing from the usually accepted ones. This is very strange, for it can be accepted as a general truth that no examination of a limited number of patients, however careful and refined, will reveal anything that the labours of generations of psychiatrists will not already have detected. The obvious explanation, that the present findings are but an accident of sampling and are not likely to be repeated with further groups, is rejected on the basis of clinical experience. Depression is a common reaction to stress, and there is no known reason why psychopaths should be exempt from it. It is a commonplace that the flaming emotional reaction of the psychopath to frustration may sometimes turn against himself and lead to a suicidal attempt, even ending in death. There is no surprise in the statement that psychopaths are deficient in feelings of guilt and in self-accusation. Furthermore, psychopathic traits tend to diminish with increasing age; so "psychopathic" depression will tend to be found in younger patients than other depressions. The present findings agree well, therefore, with clinical experience.

An alternative explanation is more likely, that nobody has considered it worth while distinguishing this syndrome from the others. Against this it might be argued that the history of psychiatry is full of systems of classification containing minute sub-divisions of clinical syndromes. Perhaps the explanation is that the syndrome has been recognized, but as it is of little significance in treatment and prognosis, it has been allowed to remain in the great group of reactive depressions, of which it is one variety.

Whether the syndrome of "psychopathic" depression (a name we use with much hesitation) had any relevance to treatment and prognosis in the past, the situation is now very different. Electroshock and psychotherapy have been available for the treatment of depressions for some time; already drugs have appeared of specific value in depressions, and improvements on them are only a matter of time. None of the treatments available is effective in all patients, and further progress is likely to depend on the differentiation of those types of depression which differ in their response to treatment. From this point of view, the present findings may contribute something of value.

SUMMARY

This paper is concerned with the development of results obtained from the use of a rating scale for depressive states.

1. Sixty-four male patients suffering from depressive states were classified, on aetiological grounds only, into four groups: Endogenous, Doubtful Endogenous, Doubtful Reactive and Reactive Depressions. It was found that the means of these four groups differed significantly in their scores in the first factor of the rating scale, and in total score on the scale. This demonstrated that endogenous depression was more severe than reactive, and that the first factor, which appeared to be a measure of retarded depression, was also a measure of endogenous depression.

2. The four groups differed significantly in their scores on certain symptoms characteristic of retarded depression, thus confirming that endogenous depression was of the retarded type.

3. The data suggested that endogenous depression not only differed quantitatively from other depressions, but that such patients constituted a different population. This finding, however, did not reach the accepted standards of statistical significance.

4. A group of eight patients with obviously abnormal ("psychopathic") personalities was compared with the rest. It was found that this group had a significantly higher score on the fourth factor of the rating scale, thus confirming that this factor was related to abnormal personality.

5. These patients showed significantly lower scores than the others in Guilt, Delayed Insomnia, Loss of Interest, Gastro-Intestinal symptoms, Loss of Weight and Age. It was suggested that these symptoms might be regarded as constituting a special syndrome, a subdivision of reactive depression, found in patients of abnormal personality.

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APPENDIX 1

AETIOLOGICAL CLASSIFICATION—ILLUSTRATIVE CASE HISTORIES

ENDOGENOUS DEPRESSION (GROUP E)

Case 77. H.J.G. 59 Years

About 3-4 months before admission, his wife noticed that he was unusually anxious over his business accounts. He kept seeking reassurance from his bank-manager and accountant that the business would not fail despite their assertion that the business was very prosperous. Gradually he developed overt depressive symptoms which were removed by a course of E.C.T. in hospital. He had a previous history of similar symptoms 7 years before with a suicidal attempt and admission to hospital. Personality extravert, showing episodic phases of mild depression with spontaneous recovery. Two sisters had histories of depressive illness and mental hospital admission.

DOUBTFUL ENDOGENOUS DEPRESSION (GROUP D.E.)

Case 13. J.D. 48 Years

For several years the patient had suffered from mitral stenosis with decompensation, which considerably limited his capacity for work. Prior to admission he gave up his employment on the plea that he was physically unable to continue it, although in fact, there had been no appreciable deterioration in his cardiac condition. He professed unusual anxiety regarding his health and slowly developed a depressive illness of very severe degree from which, having refused treatment, he eventually recovered spontaneously.

Case 23. J.H.F. 57 Years

The patient said that since the age of 14 years he had thought that his genitals were of inferior size. This had not worried him greatly until some weeks before admission when he learned that the pit at which he was employed was building new pit-head baths. He feared he would have to display his inferior genitalia before his workmates when bathing, although there was no compulsion to use the baths. He rapidly deteriorated into a severe depressive illness which resisted all treatment but which after an illness of approximately 1 year responded to leucotomy. He is now happily working in the same pit.

Case 45. L.L. 53 Years

This patient had a previous normal history. He became depressed 4 years ago and since then, apart from a very short remission following his first course of E.C.T., has remained severely depressed. He has been a patient in mental hospital for the greater part of this time. His illness began some time after being promoted from his post as Parks gardener to Superintendent of the department. The added responsibility appeared to cause him some concern. His illness resisted all treatment and he was finally leucotomized, with subsequent slow improvement.

DOUBTFUL REACTIVE DEPRESSION (GROUP D.R.)

Case 3. T.H. 61 Years

After the deaths within 6 months of his wife and only child, this patient became severely depressed. He responded to E.C.T. and was discharged home but relapsed and required re-admission to hospital. This happened on a number of occasions and the patient now appears perfectly happy to remain in hospital. The depressive symptoms are most intense and require a prolonged course of E.C.T. for their clearance. The patient is unhappy living alone but also becomes depressed in the same way after leaving hospital to live with a relative. The depressive episodes are certainly precipitated by the patient's circumstances but the pattern of the illness suggests the possibility of a strong constitutional factor.

Case 9. A.G. 59 Years

This patient became depressed after a cerebral thrombosis in 1956. He worried greatly over his temporary physical disability and inability to work. This depressive attack improved spontaneously but soon recurred. After E.C.T. the patient again improved but he has had 3 further attacks of depression since, each of which has cleared up with E.C.T. The patient has not returned to work and each depressive episode appears to be related to his anxiety over this and his health, but the pattern of development of the illness suggests that his attacks are not entirely reactive.

Case 24. R.C. 54 Years

Symptoms of depression developed 2 years ago when the patient had to give up his employment as a colliery ambulance man because of a prolapsed intervertebral disc. This greatly upset him, as he was keen on his work and felt he had lost status by giving it up. After a course of E.C.T. he improved sufficiently to return to light occupation but relapsed soon after and remained in a state of fluctuating depression. He refused E.C.T. and finally committed suicide.

REACTIVE DEPRESSION (GROUP R.)

Case 2. S.W.F. 60 Years

Patient had exhibited symptoms of a mild chronic anxiety state for many years. Over the past 2 years his married daughter in Scotland had been ill with Hodgkin's disease necessitating the patient being left alone for prolonged periods when his wife went to look after her (their only child), and the grandchildren. He slowly became depressed with increased symptoms of anxiety and tension. Following the daughter's death six months ago the patient became more depressed and this was further exacerbated by a period of anxiety following an incident when a clerk, in the department of which the patient had charge, was sacked for misappropriating office funds. The patient for a period had to carry the work of this clerk at a time of unusually increased work, due to a re-valuation programme. He eventually became unfit for work, but his disabling symptoms were rapidly cleared by a short course of E.C.T.

Case 38. H.B.M. 49 Years

Following an initial period when his principal complaint was of backache for which no organic cause was found, this patient became steadily more depressed until he required admission to hospital. He was a group surveyor in a colliery and developed his symptoms when put in charge of a reconstruction programme which was, in fact, beyond his capabilities and training. He improved with E.C.T. but quickly relapsed after discharge and a return to his employment. A further course of E.C.T. and a change of employment effected a recovery.

Case 41. A.S. 29 Years

This patient had suffered from pulmonary tuberculosis since 1948. He became depressed in 1957 when the infection was found to be bilateral, and after a quarrel with his girl friend he made a determined attempt on his life. He improved after a course of E.C.T. under antibiotic cover but soon relapsed and was admitted to hospital. He again responded to E.C.T. and was discharged home, but again relapsed, and although admitted to another psychiatric unit successfully committed suicide.

APPENDIX 2

"PSYCHOPATHIC" DEPRESSION—CASE HISTORIES

Case No. 7. A.S.W. 42 Years. Inadequate Psychopath and Paranoid Personality

The patient comes from an unhappy home with both parents alcoholic. His mother rejected him, preferring her other children, and he developed great resentment towards her. He would often remain away from home or sleep out in the fields rather than return to his unhappy situation. At school he was rather solitary, very diffident, and not particularly bright.

After school he had several low-grade jobs. He joined the R.A.F. as a regular for nine years, but was discharged in 1941 for "neurasthenia". During his period of National Service he was in trouble frequently because of his paranoid attitude to authority, and refusal to obey

orders. Since then he has had many jobs, usually losing them because of his antagonism, which is readily aroused without good reason. He has had long periods of unemployment.

He has always been a very tense, irritable personality, and has few friends as he tends to feel that people are against him and taking advantage of him. He has had feelings of inadequacy for most of his life regarding his poor stature, and he has been afraid to venture into circumstances where his body build might be displayed. He has felt unwanted and rejected by society for most of his life.

He married in 1943, but the marriage was most unhappy, and he has since been divorced. For several years he has been living with a woman by whom he has had one child now 9 years of age, who has to attend a Special School for encopresis and enuresis.

The patient has sought treatment not only because he has felt depressed and miserable, but because of his frequent outbursts of temper, and the development of paranoid attitudes to his neighbours. His home life has almost been destroyed by his irritability.

He was admitted with a history of depression for some months together with anxiety, tension, agitation, severely disturbed sleep (including early morning wakening) loss of interest and libido. He had not worked for eight months and for some weeks had been thinking of suicide.

The patient was unco-operative and defiant in his accustomed manner, and finally had to be discharged for refusing to obey hospital rules. He was re-admitted within a few days and had a course of E.C.T., after which he was greatly improved. He felt fairly well for some 3-4 months but then gradually deteriorated. He became tense, irritable, and moderately depressed and was subsequently re-admitted to hospital, but refused further E.C.T. and was treated with a modified narcosis. He eventually took his discharge against advice. His symptoms continued for a prolonged period but when last seen he had made a complete recovery, except that he had not yet tried to obtain employment.

Case No. 10. W.A. 40 Years. Inadequate Immature Psychopathic Personality

There is little information about the background history of this patient, but since leaving school he has worked as an unskilled labourer, drifting in and out of employment as the whim struck him or when he felt that people were beginning to go against him. He has had many long periods of unemployment and has wandered around the country. Since the age of 16 years he has had periods of depression, with feelings of inferiority and inability to mix with others. He has felt that people were against him and that he is an abnormal person for whom there is no future or hope.

In the last 12 years the patient has had between 10-11 admissions to hospital, on each occasion absconding or leaving against advice. His mental state on each admission has been one of severe depression with marked feelings of guilt and ideas of suicide. He has been treated by means of E.C.T. with some improvement after his early courses of treatment, but in recent years he has shown no change at all. He was finally leucotomized in June, 1958 with considerable relief of his depressive feelings. However, he continued to drift about as before, and to date has absconded twice since then. On each occasion he has wandered the country "living rough", and has eventually returned to hospital when he felt the need for the quiet life.

Case No. 34. L.B. 50 Years. Paranoid Personality, Psychopathic Traits

The patient comes from a disturbed home, his parents having warred continuously. He did not get on well with his father, and was over-dependent on his mother. He has three siblings but has no interest in them.

His school record is normal, but he was always a rather nervous diffident child. His work record is only fair, with many jobs mainly at the general labourer level. He has twice been a miner, and the second time was picked up, five years ago, by Mass Radiography and sent to a sanatorium for pulmonary tuberculosis. He is very indignant about this as he is convinced that he suffers from silicosis and not tuberculosis, and should have a pension. When he came out of the sanatorium his work record was again poor, but he has at times been working as a labourer. He has few friends and no interests, and appears to spend most of his time in bed.

At 29 years he married a girl of 16. This marriage has been most unhappy. His wife has left him on several occasions over the last twenty years mainly due to his ill-treatment of her, and his accusations regarding her morality. There may be some substance to his accusations, but he carries this attitude to a degree which must be considered completely unreasonable. There are four children of the marriage, one of whom died at the age of eight years from leukaemia. His wife recently became very worried about him because of his attempt to seduce his older daughters.

Prior to admission the patient became very worried, depressed, sleepless and lost his appetite. Four days before, he made a histrionic demonstration and put his head in the gas oven. When the gas did not affect him he decided to give up the attempt at suicide. When admitted he was very depressed. At interview, most of the time was taken up in a condemnation of his wife. His attitude in hospital was truculent, demanding, and hostile. He admitted that this characterized his attitude to his colleagues at work and his neighbours.

An X-ray showed active disease in the right upper lobe of his lungs. He was put on streptomycin and isoniazid, and because his depression was so persistent it was decided to give him a course of E.C.T. During the first treatment the patient developed a marked laryngeal

spasm, and was difficult to resuscitate. Treatment was discontinued for investigation for tuberculosis of the larynx. This was not found, but the patient would not co-operate in further treatment, and left hospital against advice.

Case No. 42. E.J. 25 Years. Immature Unstable Homosexual

The patient is the only son and has two younger sisters. He was always very timid, never joined in the usual boys' games or had their interests. He was his mother's boy and was devoted to her; his father was always rather distant from him. His schooling was normal, but he was absent a good deal because of an undescended testicle, which sometimes became inflamed.

When he was 14 years old, his mother died, and he ran the house, doing the cooking and housework until he eventually left home, the sisters being out at work. He has a poor record of employment, with numerous changes of job, usually as a waiter. Since the age of 14 he has behaved as a passive homosexual, finding emotional satisfaction in the relationship, with a feeling of security and companionship. He has never had any heterosexual interest. He has worried greatly about his homosexuality mainly because he feels that it isolates him from a secure permanent relationship which is available to other men.

In 1951 he had a left orchidectomy for malignancy, and received radiotherapy until 1956. There is a history of several admissions to mental hospitals, usually after half-hearted attempts at suicide.

He was admitted to hospital, very miserable and depressed, after trouble in his lodgings when his landlady discovered that he was homosexual. He began to develop what were for him not uncommon feelings, that he was a misfit in society and that he would never find his niche. He could see no future for himself, could not find a job or make any lasting friendship, and felt completely unwanted and rejected. He became depressed and sleepless, his appetite deteriorated and suicidal thoughts came into his mind.

After admission, his depression rapidly cleared. He settled down very quickly and appeared to enjoy his stay in hospital. This was disturbed by his emotional instability, which showed itself in histrionic outbursts, accompanied by violent threats of suicide. He would recover from these in 2-3 days, returning to his usual inadequate immature self.

He was transferred to a Neurosis Centre, where he made a further suicidal attempt and was transferred to a mental hospital.

Case No. 48. M.M. 26 Years. Immature, Unstable Psychopath

This patient's background is normal except that his mother tended to be anxious and over-protective. At school he was an intelligent lad who was not interested in his work. There is a history of delinquency, chiefly stealing. His work record shows frequent changes, but most jobs continued for a reasonable period. He worked underground in the pit on two occasions, the first lasting 6 years, but left both times because of a nervous disturbance. In recent years he has worked as a bus conductor for 18 months. He was sacked for issuing a wrong ticket to a passenger, and keeping the fare money. Since then he has had two or three jobs which have been given up easily for inadequate reasons. He has twice volunteered for the Forces but has been rejected on health grounds.

He married four years previously. The marriage has been rather unhappy because of sexual difficulties, and financial trouble. When admitted to hospital in 1957 he was £100 in debt. His wife says he is irresponsible with money, and blames it on his impairment of hearing and the mastoid operation 6 months previously, but in fact his irresponsible behaviour extends much further back.

After a quarrel with his wife he attempted suicide with an overdose of nembutal, but the circumstances suggested that it was histrionic in intention.

On admission he admitted to depression, insomnia and irritability, for at least 6 months. He was treated with E.C.T. and his depression rapidly cleared, but he was unco-operative in hospital, and eventually had to be discharged. On one occasion he took french-leave, and purported to be at home, but in fact spent the weekend with another woman. Since leaving the hospital he has been unemployed.

He was re-admitted to hospital a year later when he cut his wrist with a broken tumbler following the threat by his wife to leave him. It was appreciated that this suicidal attempt was not determined by a serious depression, and he was accordingly discharged within a few days. He was immediately arrested by the police and has since been sentenced to a term of imprisonment for this offence.

Case No. 62. J.E. 51 Years. Alcoholism

There is no history of mental illness in the family. The patient's early life, and school life are normal. He has worked in the pit for most of his life, and was at one time a prominent figure in the Union. He regrets that he gave up this work to become a pit deputy. He is very sociably minded and drinks eight to nine pints of beer a day, and is a very keen gambler on horses. He describes his alcoholism as due to his lack of will-power: he cannot leave the public house until closing time. His drinking has caused trouble at home with his wife and daughter. His wife has at times accused him of going with another woman, and on two occasions the patient has left home because of her attitude.

Six months before admission, three of his workmates were buried in a roof fall, but he himself escaped. Since that time he has been afraid of going to work. He has found difficulty in falling asleep and has been waking up frequently with cold sweats and nightmares. His appetite remained good and he maintained his interests. In the weeks prior to admission he became more depressed and developed a feeling that life was not worth living. He increased his already heavy consumption of alcohol, and because of this and his gambling, he fell into considerable debt. He then stole £9 from his daughter, and went to Doncaster races. He lost half the money, and used the rest to purchase a ticket to London where he spent most of his time wandering about the Embankment with suicide in his mind. He eventually returned home, to be informed that his daughter had reported the theft to the police, but would withdraw the charge if the money was paid back. As a result he became even more depressed, and seriously thought of drowning himself.

Two days before admission he waited until the house was empty, went to the outhouse where the gas meter was lodged, disconnected the pipe, put an overcoat over his head, and gassed himself. He was admitted after resuscitation in a general hospital, was treated with E.C.T., and made an uncomplicated recovery. Following his discharge he apparently had a further quarrel with his wife, and took himself off to the police station declaring that he was intending to commit suicide. He was re-admitted, but after a few days was again discharged and has remained well since.

Case No. 70. M.B. Age 21 Years. Anxious, Inadequate, Aggressive Personality

The patient is the oldest of four brothers and has a sister two years older than himself. He was always a very nervous, nail-biting boy, with marked neurotic traits of personality. Since the age of 7 he has suffered from spasmodic attacks of asthma and as a result, has been very much over-protected by his rather overbearing dogmatic mother. There has been considerable conflict between him and his father, who apparently despises him for his effeminacy and lack of masculine activity.

He was away from home for prolonged periods: from 8-9 years he lived with his grandparents, who frequently left him alone in the house, although he was very much afraid of being left alone and suffered from nightmares. From 12-14 years, he lived on the Isle of Wight in a Convalescent Home for his chest, and did not see his parents for the two years. He had done badly at school before that, and could not read or write when he went there, but subsequently improved.

He has an erratic work record, having worked at a variety of labouring jobs, from which he has sometimes been sacked. He was in the Army from 19-21 years of age as a butcher, and was frequently on charges because of his inability to tolerate discipline, his irresponsible attitudes, his drunkenness and violence. He is inclined to drink heavily, 8-9 pints of beer in a session, becomes aggressive and gets involved in drunken brawls. He boasts that he has a large number of girl-friends, but has never had any deep heterosexual interest. There is reason to believe that he has had some homosexual relationship during his Army years. He apparently assaulted a Corporal who he says made sexual advances to him. He was reasonably happy in the Army, but since coming out he has felt rather at sea with the world in general.

From the age of 17 years he has had waves of depression when he felt that he would never be a fully fit man and that life was not worth living. At 18 years he attempted suicide with an overdose of aspirin, but vomited it back. He told no one of his act.

He has been depressed for some time, but a few weeks before admission he lost his job through redundancy. He became very depressed, tearful, irritable, sleepless, and contemplated suicide, because of his continual fears that he was not really a fit man. While in hospital, his condition fluctuated greatly. On two occasions he returned to the ward drunk and on one of these was involved in a brawl which brought him to the notice of the police. His whole attitude to his treatment and his admission was a rather immature one in that he left everything entirely to the doctors. At interviews he would boast of his drinking abilities and his heterosexual conquests, but his interests appeared to be directed towards the homosexuals who were in the ward at that time. He improved considerably after E.C.T., but still showed neurotic symptoms.

He eventually absconded from hospital, but was brought back by his mother for discharge as she had found him a job at a butcher's. In view of his obvious instability and the shallowness of his depression, he was allowed to go.

Case No. 75. E.A. 28 Years. Inadequate Psychopath

The patient's parents are alive and in good health. He is the youngest of the family and has two brothers, one of whom suffers from epilepsy alleged to be related to a head injury in infancy, and one sister. A cousin of his father has suffered from mental disorder.

The patient's childhood appeared a reasonably happy one, but he was always timid, anxious and a chronic nail-biter. He had rheumatic fever in his early days, and as a result he was always protected, pampered, and not allowed to take part in games and sports because of his supposed heart trouble. On leaving school he became a cinema projectionist until 1954 when he was called up for the Army. He was discharged after 11 months for psychoneurosis. Since then he has had over 60 jobs; none of them has he held for any length of time.

He married 6 years ago and has two children. The marriage was reasonably happy at first, but over the past two years he has been irritable and difficult and has had frequent

quarrels with his wife. On occasions he has done things for which he claims no memory until his wife tells him about it the next day.

He drinks 6-7 pints of beer a day and smokes heavily despite the fact that he is often unemployed. He has recently developed an interest in wrestling as he has felt a need to develop his body. He boasts of his ability in this direction and would like to take it up professionally.

He was admitted to hospital with a history of depression, anxiety and poor sleep for 2 years, together with suicidal ruminations. His libido had fallen off in the last three months and he had become very depressed and agitated. In the previous three weeks he had had two episodes of loss of memory which worried him considerably. On one occasion he left the house on Friday to collect his wages, and the next thing he remembered was walking along the promenade at Blackpool with two men, with whom he discovered he had been staying and made plans to set up as a professional photographer there. Just before admission he had another loss of memory for about three hours, after which he came to in a pub with a pint of beer in front of him.

The patient could not settle and left hospital against advice a few days after admission. He was re-admitted soon after at the request of his wife who said her husband had been terribly disturbed. She gave a history that he was an inveterate liar, and she could not trust him to speak the truth at any time. He had disappeared for a weekend, and again said he had lost his memory. During this period he remained very restless and difficult, complaining about the staff and his treatment. He absconded 10 days after admission, but was re-admitted a fortnight later at the request of his doctor and again left the same day against our advice.

It has not been possible to bring him back for re-assessment, but his wife reported that he is now well again, and has been working very hard during the weeks since he was discharged from hospital.

PRINCIPLES AND METHODS OF EPIDEMIOLOGICAL RESEARCH AND THEIR APPLICATION TO PSYCHIATRIC ILLNESS*

By

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MAY I begin by qualifying the title of this paper? I can only illustrate some broad principles and a few of the methods that are used in epidemiology today—there is no attempt to be comprehensive.

In general, there are two ways of studying sick people; the clinical, where the individual patient is the centre of interest, and the epidemiological, where patients are studied in relation to the populations and groups from which they have come. Laboratory methods can be used in both of these approaches. Epidemiology can be defined as “the study of occurrence and distribution of disease”. Paul (1958) considers it to be “concerned with the circumstances under which diseases occur, where diseases tend to flourish and where they do not”. The epidemiologist tries to find populations with differing rates of illness and then compares these populations and their environments with the hope of discovering possible causes of the disease. His aim is to show how modifications of behaviour or of the environment may prevent illness; epidemiology is, in fact, the basic science of preventive medicine.

In his recent book, Morris (1957) has defined seven “uses of epidemiology”. I am only going to discuss principles and methods with reference to one of these uses—but perhaps the most important of them—the “search for causes” of disease. Some of the studies described are far removed from your specialty, but this way of looking for causes of disease began with less complex conditions than psychiatric illness. I shall begin with one or two examples of how epidemiology was used in the past; these may help you to appreciate what it is trying to do today and to see how it can be applied to problems of psychiatric illness.

I. AGENT AND ENVIRONMENT

Snow on Cholera. Epidemiology originally meant the study of epidemics and my first example is a classical investigation carried out in London by Dr. John Snow in the nineteenth century (Commonwealth Fund, 1936).

By studying the epidemics of cholera in London in the eighteen-forties, Snow, a clinician and anaesthetist, became convinced that polluted water supplies were mainly responsible for the outbreaks of disease. At this time there were many water companies supplying London and most of them drew their water from the heavily polluted Thames. There was a period from 1849 till 1853 when there was no cholera in London and during this time the Lambeth Water Company moved their waterworks upstream to Thames Ditton and so obtained

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relatively pure water. But the parts of London supplied by this company were also supplied by the Southwark and Vauxhall Company who drew their supplies from the river at Battersea—a very polluted part of the Thames. These circumstances gave Snow a chance to test his hypothesis about the spread of cholera—it was an “experiment of opportunity”, a “natural experiment”—and when this occurs, epidemiologists should be quick to use it.

An epidemic of cholera occurred in the summer of 1853 and Snow was able to show that in districts supplied only by the Southwark and Vauxhall the death rate was 114 per 100,000 while it was 60 per 100,000 in districts supplied by both companies; but there were *no* deaths at all in those districts supplied exclusively by the Lambeth Company—a nice gradation. This is an *ecological* or an *indirect* study—that is to say the occurrence of disease was related to a characteristic of an area, in this case the water supply. The indirect study only gives a lead to causation, since it cannot show any direct connection between an individual drinking polluted water and contracting the disease. In addition, the districts with different supplies may also have differed in many other ways, for example those with the “good” supply may have been wealthier and less overcrowded—and in fact to a certain extent this was so. The results then were at best only suggestive of a causal relationship between water supply and cholera. However, in 1854 Snow clinched the argument. He had discovered that in the districts where both companies supplied water, the companies were intermixed in almost every street, so that in every type of neighbourhood there were some houses supplied by the Southwark and Vauxhall, some by the Lambeth Company. When an epidemic occurred in July, he obtained the addresses of everyone who died from cholera in these districts of London where both water companies were operating and personally visited their houses to discover which supply was taken. The results are shown in Table I, which is an abbreviated version of one of Snow’s Tables. In it he listed all the districts supplied by both water companies, gave their populations at the 1851 Census and the number of deaths in each district in the 4 weeks ending on 5 August, 1854. He then divided these deaths according to the water supply of the household. The preponderance of cases in houses supplied by the Southwark and Vauxhall Company is obvious, but another step was necessary.

TABLE I
Mortality from Cholera in the Four Weeks Ending 5 August, 1854

Sub-Districts	Population in 1851	Deaths in 4 Weeks Ending 5.8.54	WATER SUPPLY				
			Southwark and Vauxhall	Lambeth	Pump- wells	Thames	Unknown
St. Saviour, Southwark	.. 19,709	26	24	—	—	2	—
St. Olave, Southwark	.. 8,015	19	15	—	—	2	2
St. John Horsleydown	.. 11,360	18	17	—	—	1	—
..	..	..	..	..	..	..	..
Borough Road	.. 15,862	21	20	1	—	—	—
..	..	..	..	..	..	..	..
Kennington (1st)	24,261	11	9	1	1	—	—
..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..
	486,936	334	286	14	4	26	4

Adapted from *Snow on Cholera*, 1936. New York: Commonwealth Fund,

He went on to find out the total number of houses supplied by each company and so was able to work out rates—Table II. The rate of cholera

deaths per 10,000 houses was 14 times greater among those supplied by the Southwark and Vauxhall than among those supplied by the Lambeth Company. A final point from this table was that the rate in Lambeth-supplied houses (5 per 10,000) was lower than that in the rest of London (9 per 10,000) although the Lambeth houses were in the area of greatest incidence of the disease.

TABLE II

Mortality from Cholera in the Four Weeks Ending 5 August, 1854

Water Company	No. of Houses Supplied	No. of Deaths in 4 Weeks Ending 5.8.54	Rate per 10,000 Houses
Southwark and Vauxhall ..	40,046	286	71
Lambeth	26,107	14	5
All others	287,345	277	9

Adapted from *Snow on Cholera*, 1936. New York: Commonwealth Fund.

Snow, therefore, had been able to relate the occurrence of disease to *individual* or *direct* characteristics—the consumption of polluted water—not just to *ecological* or *indirect* ones, and, more importantly, to do this after reducing the effects of wealth and poverty, or in technical terms—correcting for the correlated biases. A direct study is better than an indirect one, but something more is required, other environmental factors must be accounted for. In real life situations, random allocation to two groups is impossible, but some way of getting as near as possible to this ideal is essential. Because the houses with different water supplies were so intricately mingled, Snow's natural experiment achieved the effect of almost random allocation to the two companies and this makes his results especially valuable.

Here then was a completely convincing exposition of how cholera was spread, and therefore how it might be prevented; moreover Snow indicated where the specific agent causing it was likely to be found, thirty years before Koch discovered the cholera vibrio.

Goldberger and pellagra. The next example goes further and works out in greater detail the causes and prevention of a disease—pellagra. Pellagra is coming nearer to your immediate interests, since it includes among its manifestations a well-marked psychosis. In 1914 pellagra was common in some Southern States of the U.S.A. and was still considered to be an infectious disease. In fact, however, Bacelli in Italy at the end of the 19th century had related its occurrence to the growing of certain crops and had been able to diminish its incidence by a law requiring the rural population to practise rotation of crops (Sand, 1952). Goldberger (1914, 1920), of the United States Public Health Service, carried out an epidemiological study of the disease by observing in detail the conditions under which it flourished.

He first studied the occurrence of pellagra in mental hospitals and showed that, although many patients were admitted suffering from pellagra and many others developed the disease after long stay in the hospital, no case had ever been recorded among the staff. In view of the intimate contacts between patients and staff it was clear that this could not be a contagious disease. He thought that dietary differences between patients and staff might be responsible and he arranged that a colleague should try the effects of an improved diet as the sole treatment of a group of women with pellagra in a mental hospital. The results showed a high cure rate (Lorenz, 1914). Goldberger

then studied other institutions where pellagra was common. In one orphanage, for example, pellagra was only seen in the children aged 6 to 12. Those under 6 were given two mugs of fresh milk daily, while those from 6 to 12 had no milk and a diet which included fresh meat only once a week. To test his hypothesis, he carried out a simple planned experiment—this is not often possible in epidemiology. All the children were given milk every day and fresh meat four times a week, with the result that during the year of this experiment no case of pellagra occurred. In a similar experiment in a mental hospital, Goldberger found that no new case or recurrence occurred amongst a group of patients during the course of a year on special diets, while 47 per cent. of the patients in a control group had a recurrence of the disease. After further studies, including the experimental production of pellagra in a small number of convicts, Goldberger and later workers were able to give an explanation of the disease in relation to the vitamin B complex, in particular nicotinic acid, and to the action of tryptophane. Epidemiology had been as useful in uncovering the causes of pellagra as of any infectious disease.

Morris (1957) quotes in his book another interesting example of how epidemiology can be used with clinical and laboratory methods to solve a problem. A condition of epidemic dropsy was recognized in Bengal and differentiated clinically from beri-beri and hunger oedema. Epidemiological study showed that outbreaks occurred in groups, especially among middle-class people, and in particular villages and households. Diet was implicated and the disease was found to be associated with curries prepared with mustard oil. Laboratory studies were then able to show by animal experiments and with human volunteers that the disease was a poisoning caused by an oil from Mexican poppy seeds contaminating the mustard oil.

In these examples the agent causing the disease, either by its presence or its absence, was quite specific and was a necessary and apparently sufficient cause. That is to say, very many of those subjected to it in sufficient dosage contracted the disease. In these circumstances, epidemiological studies, by concentrating on the environment and ways of living of the patients, could produce strong leads to the causes and ways of preventing the disease. But this is a rare state of affairs in medicine. Usually other factors such as the susceptibility of the patient are also very important. Thus it was recognized long ago that the tubercle bacillus, although a necessary cause of tuberculosis, is not at all a sufficient one. The state of resistance of the person infected, derived from his heredity and previous experience, is very relevant. The epidemiology of tuberculosis, then, must take into account host factors as well as the agent and the environment.

II. HOST, AGENT AND ENVIRONMENT

Poliomyelitis. One of the best examples of a disease with a specific causative agent but where the susceptibility of the host is all-important is poliomyelitis. Epidemiology has had a difficult task here, because the virus is widespread and susceptibles apparently few and far between. Burnet (1953) has shown how study of the age incidence—that is the number of cases occurring per 1,000 of the population at risk by defined age groups—in various epidemics has helped our understanding of the disease. For example, when paralytic poliomyelitis was first recognized here at the end of the 19th century it was a disease of babies—hence “infantile paralysis”. In succeeding outbreaks the incidence among very young children has lessened while more and more cases have

occurred in older children and young adults. However, when an epidemic occurred in Malta in 1942, incidence was highest among babies, while a similar epidemic in the isolated community of St. Helena in 1947 had a maximum incidence among young adults. It is known that young adults are the most susceptible age group when infection with a new virus is introduced into a community. (This was shown clearly in the influenza epidemic of 1918-19.) From these and other facts, a theory has been built up linking the appearance of epidemics of poliomyelitis with better sanitation—and therefore with *less* chance of infection. It is postulated that infection with the virus in this country was practically universal a hundred years ago. As sanitation improved slightly, infection became less common and infants were the first age group to lose their immunity and thus to develop the disease when infected. As sub-clinical infection became progressively less widespread, it became possible to reach adult life without developing any immunity, and thus to contract the disease when infection did occur. In Malta, sub-clinical infection had always been widespread and the epidemic developed like those here fifty years ago. In St. Helena the virus was probably introduced for the first time to a susceptible community and young adults suffered most. This theory that the better the environment, the more likely is disease to follow infection, is borne out by the Registrar General's Occupational Mortality figures for 1949-53. The mortality ratio of social classes I and II, professional and business people, is much higher than that of the other classes.

I have mentioned poliomyelitis to illustrate two points. First, that even in a disease where the relationship between causal agent and the occurrence of clinical illness is complicated, such simple measures as age incidence can help in understanding the causes of the disease. Secondly, to show a general way of organizing an epidemiological enquiry under the headings of "time", "place" and "persons". The changing age incidence of disease in *time*, the differing age incidence in *places*, and the differing incidence amongst *persons* in different social classes all helped to clarify the natural history of poliomyelitis.

Some years ago Ryle (1942) made a plea for wider concepts of aetiology than that of a specific cause of a disease. He pointed out that the great bacteriological and clinical discoveries had led to a search for "single determining causes where none exist", and that even in such acute diseases as lobar pneumonia, many associated causes in addition to the pneumococcus play a part. A similar plea has been made by Galdston (1954). This realization that knowledge of a specific causative agent does not fully explain the causation of disease and that in many diseases there may be no such agent makes it essential to study the circumstances where "disease tends to flourish". This surely applies even more to psychiatric than to other illnesses. Much psychiatric illness, like coronary heart disease, probably has no specific causative agent, and the appearance of clinical disease depends upon the interaction of factors in the host and of factors in the environment. In this type of disease, susceptibility is no longer as simple as in poliomyelitis, but is probably a complex affair of genetic and other factors.

III. HOST AND ENVIRONMENT

Durkheim and suicide. One of the early studies of this kind of condition was Durkheim's classical work on suicide. He was investigating the social factors in the environment that appeared to be associated with suicide and I should like to consider one of his methods in detail.

Durkheim (1951) used figures available to him in official publications—he did not carry out surveys himself. This is often an early step in epidemiological research and it may provide clues that can be followed up by special surveys.

Durkheim was interested in the relationship between religion and suicide. He found that the predominantly Catholic countries had a much lower suicide rate than the mainly Protestant ones with the mixed countries in between. However, the Catholic and Protestant countries differed in many other ways besides religion—how then was he to test whether religion was in fact the important factor? He does so quite simply by testing the relationship within countries. For example, Bavaria was the German state with the lowest proportion of suicides and the lowest proportion of Protestants. *Within* Bavaria, the relationship holds good within provinces. Similarly he analysed the figures for Prussia and the Prussian provinces. The analysis in Switzerland introduced a third factor—language, since both French and German speaking areas contained some districts that were largely Catholic and others that were mainly Protestant. He was therefore able to show that suicide was higher where there were more Protestants, holding nationality and language constant. In fact he carried out seventeen of these essentially independent comparisons between Catholic and Protestant areas: such independent comparisons are called “replications”. In every case the Protestant areas had higher suicide rates. The odds against this finding being due to chance are about 100,000 to 1. Here is where statistics makes a no doubt unwelcome appearance, but there is no escaping the fact that statistics play an important part in epidemiology. Tests of significance—that is to say ways of working out the odds that, for example, the difference between the suicide rates of two groups is due to chance or not, can strictly only be applied to groups that have been made up at random. But it is impossible to assign Catholics and Protestants at random to two countries and a simple significance test between the suicide rates in Catholic and Protestant countries could tell us nothing. There are far too many unknown factors that may account for the difference. However, Durkheim’s method of replications avoids many of these difficulties, and the fact that the same result is found in seventeen independent comparisons within countries and provinces gets rid of most of the correlated bias and makes it possible to work out the odds against chance very simply. This again, like Snow’s first study, was an indirect or ecological one, but Durkheim was able to obtain figures of suicide rates amongst Protestants and Catholics in various countries and show that using these *individual* rates, the direct method, the same preponderance of suicide among Protestants was present.

Durkheim did not find a “natural experiment” to simulate random allocation of people to the two religions but instead he used the method of replication to minimize correlated bias. His results do not demonstrate a “cause” of suicide, as Snow demonstrated a “cause” of cholera, but they do imply a strong link between suicide rates and particular religions and give clues to environmental factors favouring suicide. There is a most interesting discussion on this and other points about Durkheim’s methodology in a recent issue of the *American Journal of Sociology* (Selvin, 1958).

Morris and coronary disease. A similar method was used by Morris and his colleagues (1953) in considering the relationship between physical activity of work and coronary heart disease. Very briefly, Morris found that drivers of London’s double-decker buses had a higher sudden death rate from coronary

disease than conductors. He considered three possible explanations—that drivers were constitutionally different to conductors, that there were different nervous stresses involved, or that the different physical activity of the two groups was responsible for their different mortality rates. Physical activity seemed to him the most likely explanation. (Significance tests cannot help in deciding whether or not physical activity *was* the important factor.) He went on to compare the rates in postmen and clerks in the post office and again found the physically less active group—the clerks—to have higher rates. Next, he went back to the published death rates by occupations in the Occupational Mortality volume of the Registrar General's Decennial Supplement for 1930–32. The men were divided into three groups of heavy workers, light workers and an intermediate group and again he found that the light workers had the highest rates. Such independent checks of his hypothesis make it likely that physical activity is in fact the important factor in the difference found between driver and conductors. By replication, then, Morris was able to test his hypothesis in spite of the fact that it was not possible to assign men at random to active and inactive jobs. Since then, a completely different approach—a national pathological study—has corroborated the hypothesis that physical activity at work is protective against coronary heart disease (Morris and Crawford, 1958).

Place of statistics. I should like to digress here to introduce a definition of statistics from a recent American text book (Wallis and Roberts, 1957), a definition that is at any rate more polite than many of the well-known ones. It is this—"Statistics is a body of methods for making wise decisions in the face of uncertainty". The authors point out that most scientific work consists of observation, the formulation of hypotheses, prediction of the results in certain circumstances if the hypothesis is true, and the verification of the prediction. Statistical methods are necessary in two of these processes—in the observation stage they show how best to collect data and in verification they determine whether new facts observed are consistent with the predictions and therefore with the hypothesis. It is at this stage that significance tests are used and that decisions are made on their results. The usual uncertainty is whether or not a hypothesis is "corroborated" or "falsified" by the new data and here statistical methods help towards "a wise decision".

Since epidemiology necessarily involves the use of numbers and rates and the comparison of rates between groups, a knowledge of broad statistical principles is essential. This does not mean that you must know all the tricks of the statistical trade before carrying out an epidemiological study, but simply that you must understand the basis of statistical reasoning. Both Snow and Durkheim were working before statistical theory had been developed but both were using essentially statistical reasoning and coping with "correlated bias" very successfully.

Schizophrenia. I shall conclude by discussing one or two applications of epidemiology in the study of schizophrenia—an illness where, like coronary disease, the concept of a specific agent is most unlikely. Schizophrenia has been defined as "a group of genetically determined, though environmentally precipitated, biochemical disorders" (Tait, 1957). This definition is a useful one for epidemiologists if we recognize that "biochemical" is still controversial and that "environmentally precipitated" covers a wide range of circumstances from early life to recent and current environment. In schizophrenia, then, the "host" factors probably include both the genetic constitution of the

individual and his experiences earlier in life, while the clinical manifestation of the disease may possibly be precipitated by current environmental factors. It can often be difficult to decide whether a particular environmental factor is operating as a cause or whether individuals subject themselves to that factor because in some way it attracts those who are susceptible to the disease. For example, Ødegård (1936) made a careful study of the first admission rates for schizophrenia of Norwegians in Norway, and of Norwegians who had emigrated to Minnesota. He found that the admission rate was twice as high among the emigrants compared to those who stayed in Norway. On the face of it, this suggests that the difficulties facing an immigrant in a strange land are factors precipitating schizophrenia. But he went further and showed (1) that the age at onset was the same in both groups and (2) that there was no tendency for the disease to show itself during the first five years of the patient's life in America. The suggestion is, therefore, that emigrants include a higher proportion of susceptibles than the rest of the population and not merely that the emigration precipitates the disease. Similarly, is the well-known preponderance of schizophrenia among single men due to the factor of marriage "protecting" men against the disease, or is it because few susceptibles marry? Ødegård (1953) has produced some evidence which is summarized in Tables III and IV. Table III shows the very great difference between the admission rates of single and married men and women. Table IV shows that the widowed have admission rates not much in excess of those for the married but that the divorced have rates very similar to those for single people. Ødegård argues from these figures (and from clinical studies) that marriage is *not* in fact protective and that the explanation is that susceptibles rarely marry: if they do, the marriage is often unsuccessful.

TABLE III

Schizophrenia

*Annual First Admission Rates per 100,000 in Norway, 1931-45**
Standardized Rates, Ages 20-89 Years

	Single	Married	Ratio of Single/Married
Men	534	124	4.3
Women	495	133	3.7

* Ødegård, Ø. (1953).

TABLE IV

Schizophrenia

*Annual First Admission Rates per 100,000 in Norway, 1931-45**
Standardized Rates, Ages 30-69 Years

	Married	Widowed	Divorced	Ratio of Divorced/ Married	Ratio of Widowed/ Married
Men	101	189	501	5.0	1.9
Women	137	159	486	3.5	1.2

* Ødegård, Ø. (1953).

You will notice that the figures given in these Tables refer to first admissions to hospital. In the psychiatric field, statistics of first admissions to mental hospitals are being used in the same kind of way that mortality statistics are used in, for instance, coronary disease. That is, as a first approximation to the real *incidence* of disease, acknowledging that diagnostic difficulties and selection

of patients will undoubtedly bias these figures in many ways. (*Incidence* is defined as the number of new cases of a disease arising in a known population within a stated interval of time. *Prevalence* is the number of cases present in the population during a stated interval.) Allowing for this bias, first admissions of men with a diagnosis of schizophrenia give the only data at present available in this country on the incidence of the disease. Incidence is a fundamental measure in the epidemiological "search for causes" since much of this search consists of comparing the number of new cases of disease occurring in various sub-groups of the population. Until better figures are available we must work with these admission statistics.

There have been many epidemiological studies of schizophrenia, especially in the United States and in Scandinavia, and these can be considered under our headings of time, place and persons.* For example, under "time", Ødegård (1954) has demonstrated how the incidence fell in Norway during the war, while there are various studies (e.g. Eaton and Weil, 1955) demonstrating the different incidence in "places" with widely differing cultures. The development of these kinds of studies may well give clues to environmental factors influencing the disease. Under "persons", there has been a good deal of interest in the *social class* of schizophrenic patients. You will all be familiar with the American studies, especially those of Faris and Dunham (1939) in Chicago before the war and Hollingshead and Redlich (1958) in New Haven very recently, that have shown how the incidence of schizophrenia is higher in slum districts of cities and among the unskilled classes generally. In this country, Brooke (1958) has shown that first admissions of men with schizophrenia are much higher amongst men in social class V—the unskilled labourers—than in the other classes. Hollingshead and Redlich also showed that the schizophrenic patients in their social class V† came from families of this class. In other words, their childhood environment had been that of the poorest section of the community. If this finding could be confirmed in this country it would be of great importance because here would be a lead to the kind of environment that might be helping to produce the disease in susceptible individuals.

IV. WORK IN PROGRESS

Two of my colleagues, E. M. Goldberg and D. H. Allcorn, began to look into this question of social class and schizophrenia by first considering the quality of the data on which the Registrar General's figures were based. It was possible that the patient's occupation as recorded in the mental hospital was inaccurate and that this was the cause of the apparent excess of men in social class V. A pilot study was carried out at Long Grove Hospital in 1956 and the occupational histories of 40 consecutive male admissions between the ages of 15 and 35 with a diagnosis of schizophrenia were investigated. It was found that the classification of their jobs on the cards sent to the General Register Office corresponded with the facts as ascertained by interview with the patient and by visits to their parents and that there was a characteristic concentration of admissions among unskilled workers.

* For a more detailed review of some of these studies, see Morrison (1958).

† In this country social class is a purely occupational classification. The five classes are made up as follows: I—professional and senior management, II—junior management, shopkeepers, III—skilled workers, both manual and non-manual, IV—partly skilled, V—unskilled workers. Hollingshead and Redlich (*loc. cit.*) use a more complicated "Index of Social Position", which includes occupation, education and address, to allocate individuals to their five classes. The two systems are therefore not directly comparable; though of course occupation is highly correlated with education and place of residence.

The pilot series lent little support to the notion that the concentration of admissions among semi-skilled and unskilled workers reported by the Registrar General is due to their downward "drift" either before the first admission to a mental hospital, or later. Most patients in fact had stayed in the same occupational grade throughout their "careers".

In the course of visiting the families of the 40 patients in East London, Goldberg (1959) noted that nearly half of the patients' homes had been "broken" during their childhood, either through parental death or various kinds of prolonged separation. A further sizeable proportion of cases showed considerable disturbance or serious conflict in family relationships. Much gross psychiatric disorder was reported among the members of the families. These observations in conjunction with the fact that the concentration of young schizophrenics in the lowest social classes was not the result of *individual* occupational drift suggested that there might be a downward drift from one generation to another due to the operation of multiple factors, genetic and environmental.

E. M. Goldberg is now carrying out a comprehensive study of the families of young men admitted to Goodmayes Hospital in Essex. She is gathering systematic information about many aspects of the patients' families, including the occupations of grandparents, parents and siblings, the family structure and family relationships, and details of mental hospital admissions and gross mental abnormality in the family.

When we looked at the occupational distribution of the first 20 patients at Goodmayes we found the usual concentration in unskilled jobs, but the fathers of the patients had a much wider range of occupations. In fact, they seemed to represent a reasonable occupational cross-section of the population at the time of their sons' admission to a mental hospital, and there was a definite drop in social class from father to son. It was possible that the sons were too young to have reached their "final" occupational status and that the fathers were in lower social classes when they were the present age of the sons.

We decided to test the hypothesis that there is a real drop in social class from father to son, taking into account these two factors, by using data in the General Register Office from the whole of England and Wales. The hypothesis, then, was as follows: "male first admissions to mental hospitals with a diagnosis of schizophrenia show a marked excess in social class V. This excess is found among men aged 16-24 years but it is also present among men aged 25-34 years, who should have reached their 'final' occupation. The fathers of these men, however, when they were aged from 20-44 years (that is, at the time of the birth of the patients), showed no concentration in social class V but instead had the same social class composition as the population as a whole".

The General Register Office was asked, and very kindly agreed, to extract the cards* of men aged 20-34 years who were first admitted to mental hospitals in England and Wales in 1956 with a diagnosis of schizophrenia. Data on these cards included the patient's date of birth, his occupation and the address from which he was admitted. The birth certificate of each patient was then sought. When found, this gave the occupation of the father when the patient was born and the address at that time. Admission cards for each year are filed alphabetically and a pilot study was carried out in which the first 286 patients were selected. Of these 232 birth entries were found (81 per cent.). A large proportion of the 54 patients whose birth entry could not be found had foreign names.

* These are the cards sent to the General Register Office by every mental hospital for every patient admitted.

The extraction of the admission cards and the tracing of birth entries were carried out in the General Register Office and the results were given to us only after names and addresses had been removed.

The results for the 232 patients born in England and Wales were analysed in two age groups, 20–24 years on first admission and 25–34 years. There were only 60 patients aged 20–24 years and the numbers are not sufficient to “corroborate” or “falsify” the hypothesis. The results for patients aged 25–34 years are shown in Table V.

TABLE V
Social Class Distribution of Schizophrenic Patients and Their Fathers
Male First Admissions Aged 25–34 Years
England and Wales, 1956

Social Class					Patients		Fathers	
					Observed	Expected*	Observed	Expected†
I	..	..	..	..	3	5	6	4
II	..	..	..	..	11	20	16	20
III	..	..	..	..	74	93	90	88
IV	..	..	..	..	28	25	31	31
V	..	..	..	..	45	18	27	27
Total	..	..	..	..	161	161	170	170
Not stated	..	..	..	..	11	—	2	—

* From 1951 Census distribution of men aged 25–34.

† From 1931 Census distribution of men aged 20–44.

This table shows the expected excess of patients in social class V (45 observed, 18 expected on the basis of the social class distribution of men aged 25–34 years in the 1951 Census) and it shows that the fathers of these patients conform very closely to the social class distribution of men aged 20–44 in the 1931 Census. This small sample study thus corroborates the hypothesis. Table VI illustrates the movements in social class between father and son. The numbers in italics are those patients who are in the same social classes as their fathers.

TABLE VI
Social Class Distribution of Schizophrenic Patients and Their Fathers
Male First Admissions Aged 25–34 Years
England and Wales, 1956

		Social Class of Fathers					Total
		I	II	III	IV	V	
Social Class of Patients	I	<i>1</i>	2	—	—	—	3
	II	2	2	6	1	—	11
	III	2	5	<i>46</i>	10	11	74
	IV	—	3	12	<i>10</i>	1	26
	V	—	2	21	9	<i>13</i>	45
Total	..	5	14	85	30	25	159

Numbers in italics are of patients who are in the same social class as their fathers.

These results are very different from those of Hollingshead and Redlich (*loc. cit.*), who found that 91 per cent. of their schizophrenic patients were in the same class as their parents and that the parents, therefore, showed the same preponderance in class V as the patients.

We hope to analyse a further sample of about the same size in order to have sufficient numbers of men aged 20–24 years to test our hypothesis, and to provide another test of the results for men aged 25–34 years. In addition, we are in process of analysing the residential data for men of 25–34. First results indicate that the expected excess of patients from large towns is present but there is also an excess *born* in the large towns. In other words, the concentration of patients from the cities may not be explained by immigration from rural areas.

We are planning to check the results of the birth certificate enquiry and to obtain more detailed information about the socio-economic background of young schizophrenic patients by asking every mental hospital in England and Wales to complete a questionnaire on six consecutive male first admissions under the age of 35. We do appreciate how difficult it is to fit in this kind of extra work in hospital and we are cutting the questionnaire to the barest possible minimum. However, there is no other way of getting this information about a national sample of patients and we feel that it is important to clear up this question of whether or not a particular social environment during childhood is related to the later development of schizophrenia. We hope that this Association will give us their blessing before we approach medical superintendents.

We are thus using three complementary methods of investigation: (1) intensive clinical case studies of an unselected, consecutive series of patients and their families; (2) an extensive survey of a national sample of patients; and (3) national "vital statistical" type information. The clinical study suggested various hypotheses, and one of these has been tested by using information already available in the General Register Office. The hypothesis, now modified, is being further tested by an extensive survey.

Clinical study has therefore enabled sociological hypotheses to be formulated, but epidemiological methods are necessary to test them, since the intensive case study can only be carried out on small numbers of patients who cannot be representative of patients in the country as a whole.

V. CONCLUSIONS

I hope that these examples of how epidemiology has been used in the past and one illustration of "work in progress" today will help to enlarge your interest in epidemiological principles and methods. I am sure that the other papers to be given today will illustrate methods that have not been mentioned in this paper. Perhaps by the end of the day you will agree that epidemiology can be of use to you in your search for the causes of psychiatric illness.

VI. ACKNOWLEDGMENTS

I am most grateful to the General Register Office for drawing the sample of admission cards and searching for the relevant birth certificates; I am also grateful to Miss E. M. Goldberg and other colleagues in the Social Medicine Research Unit for their advice.

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THE SERUM LIPOPROTEINS OF MENTALLY RETARDED CHILDREN

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BECAUSE of the importance of the serum lipids in the pathogenesis of atherosclerosis, much information is available on the serum lipoproteins of adults in health and disease (Adlersberg *et al.*, 1955; Chapin, 1956; Dangerfield and Smith, 1955; Jencks *et al.*, 1956; Kanabrocki *et al.*, 1958). The lipoproteins in childhood have been studied less extensively. Rafstedt (1955) has reported lipid and lipoprotein values for normal infants and children. More recently, Salt and Wolff (1957) have found that paper electrophoresis of the lipoproteins is of value in a number of diseases of infancy and childhood involving lipid metabolism primarily or secondarily. These authors detected abnormalities in the serum lipoproteins in gargoylism and the severe form of hypercalcaemia of infancy, conditions associated with mental defect. Using the ultra-centrifuge, Simon *et al.* (1954) had earlier demonstrated an increase in the level of certain low density lipoproteins in patients with mongolism, and work in this department (Stern and Lewis, 1957, 1958a) indicated that lipid metabolism is disturbed in children with mongolism and some other mentally retarded children. Paper electrophoresis was chosen as the method for a further study of the serum lipids in mental deficiency. Of particular interest was the possible relation of abnormalities in the serum lipoproteins to the disturbance responsible for the mental defect.

METHODS

The mental defect could be unequivocally linked to a definite disease entity in only 21 per cent. of 1,900 patients investigated at this hospital over the past twelve years. Of these, nearly two-thirds were cases of mongolism, while phenylketonuria, the phakomatoses, postnatal meningitis and kernicterus accounted for about three-quarters of the remainder (Berg, 1958). Due to deaths and discharges, the number of patients in the above groups at present in the hospital was much smaller. It was possible to collect eight well-established cases from each group, but a rather wide age range had to be tolerated and it was impossible to match the patients accurately for age, sex and mental level (Table I). It is worth noting that the mechanism by which the lesions responsible for the mental defect are produced is clearly different in these five syndromes. Eight children and eight adults, whose mental defect was "unclassified", i.e. not attributed to any one cause, were also included in this investigation. For comparison, data were available for nine normal, healthy children living at home, and sixteen normal, healthy adults (Stern and Lewis, 1958b). As far as could be ascertained, all patients were in good general health at the time of the

investigation. The composition of the diet was the same for all patients, only the consistency varied depending on the child's ability to chew.

All estimations were done with capillary blood obtained from fasting subjects. Electrophoresis was carried out, within two hours of the collection of the sample, by the horizontal open strip technique at 4° C. with Whatman No. 1 paper and barbiturate buffer pH 8.6. The lipid stain used was Oil Red O (Gurr). Four fractions were estimated by elution with glacial acetic acid and spectrophotometry at 522 m μ : the α -lipoprotein, the β -lipoprotein, the "rest" fraction, R, i.e. the lipid devoid of electrophoretic mobility, and the lipid between the β and α bands, here called β^1 -lipoprotein. This fraction includes any pre- β lipid of Dangerfield and Smith (1955). Total lipids were determined by comparing the dye uptake on paper of 0.01 ml. samples of the sera with that of a sample the lipid content of which had been estimated by the method of Sperry (1955). Full details of the methods used are given elsewhere (Stern and Lewis, 1958a, b.)

RESULTS AND DISCUSSION

The results for twenty-five normal subjects and fifty-six patients are summarized in Table I. The percentage of α -lipoprotein and the ratio β -lipoprotein : α -lipoprotein, the " β/α ratio", (Salt and Wolff, 1957) were found the most useful parameters in the characterization of the lipoprotein patterns, as pathological changes in the serum lipoproteins include in almost all cases a decrease in the proportion of α -lipoprotein and/or an increase in the β/α ratio. No statistically significant difference in these quantities is demonstrable between our normal adults and children. The mean α -lipoprotein fraction for the combined group of twenty-five normal subjects is 24.2 per cent., standard deviation 4.0, and the mean β/α ratio 2.2, standard deviation 0.6. Thus with our method 99 per cent. of normal α -lipoprotein fractions form 14.9 per cent. or more of the total lipids, while 99 per cent. of normal β/α ratios fall below 3.7. Samples with β/α ratios of 3.7 or greater or α -lipoprotein fractions of 14.8 per cent. or less were therefore taken to fall outside the normal range. Table II shows that abnormal α -lipoprotein fractions and β/α ratios occur in all diagnostic groups. No abnormalities were detected in the total lipids, the β -lipoprotein, β^1 -lipoprotein and the "rest" fraction, and in no instance were abnormal mobilities encountered. Low α -lipoprotein fractions and high β/α ratios were not confined to mentally retarded children, three out of eight mentally defective adults were similarly affected. Distinct pre- β lipid bands were found in only one adult patient and one adult normal subject. Examination of the case records of the patients with abnormal lipoprotein patterns produced no evidence that infectious or other illness was more frequent or the mental level lower in this group than in the other patients investigated. The occurrence of abnormal lipoprotein distributions in children with mongolism is not unexpected in view of the observations of Simon *et al.* (1954) and Stern and Lewis (1957) referred to earlier. A further, more extensive study of the serum lipoproteins in mongolism is now in progress in this department. There is no doubt that grossly abnormal serum lipoprotein patterns are also found in a significant proportion of mentally retarded patients in the other diagnostic categories. Unfortunately, the number of patients in these groups available for investigation was too small to permit a statistical analysis of the comparative frequency with which the lipoprotein abnormalities occurred. Furthermore, the fact that these abnormalities are found irrespective of the

TABLE I
Serum Lipids in 56 Mentally Retarded Patients and 25 Normal Subjects

Classification (Aetiological Factors)	N	Age	I.Q.	Total Lipids (mg./100 ml.)	Lipoprotein Fractions as Per Cent.				β/α Ratio
					α	β	β^1	R	
Phenylketonuria	..	4 y. 8 m.-9 y. 10 m.	31 12-64	570 355-720	19.5 11.8-22.8	53.5 46.1-62.4	6.3 2.3-9.3	20.7 16.3-26.4	2.9 2.1-5.1
Mongolism	..	5 y. 8 m.-9 y. 8 m.	34 8-48	635 440-740	16.4 5.7-24.4	59.2 51.3-71.0	4.6 2.1-8.0	19.8 15.9-25.1	4.5 2.1-12.5
Phakomatosis (epiloia, naevoid amentia and neurofibromatosis)	8	6 y. 10 m.-14 y. 4 m.	19 9-49	655 515-775	21.5 14.8-27.1	52.4 46.3-57.1	4.4 2.4-8.3	21.7 18.9-26.0	2.6 1.9-3.8
Post-meningitic	..	1 y. 10 m.-12 y. 1 m.	12 5-37	615 465-725	16.6 8.7-27.4	58.7 40.0-69.1	3.7 1.9-5.4	21.0 16.6-29.1	4.1 1.5-7.9
Kernicterus	..	2 y. 8 m.-17 y. 10 m.	28 6-48	670 505-1,005	21.0 16.0-29.5	53.0 42.6-63.1	3.8 1.6-5.7	22.2 17.1-32.8	2.7 1.5-3.7
Unclassified (Children)	..	11 y. 0 m. 3 y. 11 m.-14 y. 9 m.	24 15-34	610 500-910	17.2 14.0-23.0	54.6 49.6-61.6	5.5 2.4-2.6	22.7 20.1-24.2	3.3 2.3-4.4
Unclassified (Adults)	..	24 y. 0 m. 21 y.-29 y.	10 (no score -13)	755 570-855	17.4 11.1-27.2	60.7 46.0-72.0	3.6 1.4-5.6	18.3 10.3-31.5	3.9 1.7-6.2
Normal children	..	7 y. 4 m. 4 y.-12 y.	—	625 510-705	25.4 21.3-31.4	51.9 45.0-62.8	5.5 3.7-8.3	17.2 10.6-22.4	2.1 1.4-2.9
Normal adults	..	27 y. 17 y.-36 y.	—	760 640-1,240	23.5 16.7-32.0	51.7 43.7-60.7	6.0 2.6-9.5	18.8 13.5-24.4	2.3 1.4-3.6

The mean value and range are given in all cases.

TABLE II

Abnormal Lipoprotein Values in the Sera of Mentally Retarded Patients

Diagnostic Group	Number of Cases	Normal	Abnormal
Phenylketonuria ..	8	7	1 (a) 11.8, 5.1
Mongolism ..	8	5	3 (a) 13.3, 4.3 (b) 14.3, 4.3 (c) 5.7, 12.5
Phakomatosis ..	8	7	1 (a) 14.8, 3.8
Meningitis	8	4	4 (a) 8.7, 7.9 (b) 11.1, 5.6 (c) 12.4, 4.7 (d) 14.5, 4.4
Kernicterus	8	7	1 (a) 16.0*, 3.7
Unclassified (children) ..	8	5	3 (a) 14.7, 3.7 (b) 14.4, 3.9 (c) 14.0, 4.4
Unclassified (adults) ..	8	5	3 (a) 12.5, 4.2 (b) 11.6, 6.2 (c) 11.1, 6.1
Total	56	40	16

* Border line value.

In column 4 the values for the α -lipoprotein fraction are given (as per cent. of total lipid) followed in each case by the β/α ratio.

cause of the mental defect, limits the usefulness of the method in mental deficiency work, e.g. in the diagnosis of conditions associated with mental defect in which lipid abnormalities have been reported, such as gargoylism (Salt and Wolff, 1957).

There is no simple interpretation of our data. The possibility cannot be excluded that in some children malnutrition or other illness prior to admission produced changes in the serum lipoproteins, presumably by damage to the liver, which persisted after clinical recovery. A more likely explanation is that severe lesions of the nervous system, whatever their nature or cause, impair the neuroendocrine control of lipid metabolism, limiting the ability of the organism to counteract shifts in the proportions of the lipoprotein fractions.

SUMMARY

Using paper electrophoresis, the serum lipoproteins were determined in fifty-six severely mentally retarded children and eight mentally defective adults and compared to those of twenty-five normal subjects. The mentally retarded children formed five groups of eight in whom the mental defect was respectively associated with or attributed to mongolism, phenylketonuria, phakomatosis, kernicterus and meningitis. In the remaining eight children and eight adults, the mental defect was unclassified.

Abnormally high ratios of β -lipoprotein to α -lipoprotein and low α -lipoprotein fractions were found in sixteen of fifty-six patients, irrespective of the nature of the lesion responsible for the mental defect, the mental level, and the age of the patients. It is suggested that in these patients the neuroendocrine control of lipid metabolism may be impaired.

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LEARNING ABILITY DURING A COURSE OF 20 ELECTROSHOCK TREATMENTS

By

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I. INTRODUCTION

RECENT work at this hospital (Thorpe and Baker, 1958) has suggested that schizophrenic patients tested one week after completing a course of twenty E.C.T.s do not show significantly more impairment in some psychological functions than similar patients treated with insulin coma or chlorpromazine therapies. This finding may come as a surprise to many, particularly in view of the fact that disorientation, memory loss, and confusion are frequently seen during the course of electrical treatment.

The present report describes an evaluation of the course of electrical treatment in terms of a simple test of learning ability. Learning ability, which might, within the context of the present experiment be more accurately designated "the ability to perform on a learning test" has been chosen because of its relationship to most of the changes observable in schizophrenic patients receiving this treatment. These changes are usually as follows:

- (i) The disappearance of schizophrenic symptoms.
- (ii) An increase in co-operation.
- (iii) The appearance of disorientation and confusion.
- (iv) Memory impairment.

It is clear that a patient's ability to learn a series of nonsense syllables can be expected to be influenced by all these factors in one way or another. It is also clear that disappearance of symptoms, increase in co-operation, *absence* of disorientation and confusion, and *absence* of memory impairment will favour high scores on the learning test.

A simple test of the ability to learn can therefore be used as an objective and useful means of assessing the course of electrical treatment.

II. METHOD

As the experiment was carried out in two distinct parts it will be expedient to describe them separately.

A.—PART ONE

(i) *Subjects*

Ten newly-admitted female patients who had an overt schizophrenic psychosis on admission formed the experimental group. Five had previously received physical treatment for their schizophrenia while five had not. The mean age for the whole group was thirty years, ranging from twenty to thirty-eight years.

(ii) *Treatment*

Full details of the treatment techniques are given elsewhere (Baker, Game, and Thorpe, 1958). Briefly, twenty electrical treatments were given at the rate of three a week up to the twelfth, two a week up to eighteen, and one a week up to twenty. Treatment was administered at 9.30 a.m. with a standard "Ectron" machine, employing "Ectonus" technique (Russell, Page and Jillett, 1953). Relaxants and/or pentothal were given to those patients in need of them, but these formed only the small proportion of one patient in ten.

(iii) *The Learning Test*

This comprised lists of ten three-letter nonsense syllables which were constructed specially for the experiment. The serial anticipation method using a memory drum was employed. That is, the list of ten syllables was presented one syllable at a time, which the patient read out. When all ten syllables had appeared the patient had to say what was the first one on the list, then the second and so on, the next syllable being revealed only when an attempt had been made to anticipate it. The list was presented six times after the first "introductory" presentation and the total number of correct anticipations was recorded.

(iv) *Procedure*

In this part of the experiment each patient was tested individually. The first list of syllables was always given following the first electroshock treatment, the second list of syllables following the second treatment and so on right through the course of treatment. Testing was carried out at 2.0 p.m. on treatment days and again one week following the last treatment.

B.—PART TWO

(i) *Subjects*

A second group of ten patients as described in Part One, with a mean age of thirty-two years and an age range of nineteen to thirty-seven years.

(ii) *Treatment*

Exactly the same as in Part One.

(iii) *The Learning Test*

This comprised the lists of syllables used in Part One. This list was written out on a blackboard and exposed for 20 seconds. The patients were then asked to write out as many syllables as they could remember on the sheet of paper provided. One minute was allowed for writing. The sheets were then collected, a second exposure made for 20 seconds and so on. The syllables were exposed six times in all, and the total number of correct responses was recorded. No penalty was awarded for incorrect order.

(iv) *Procedure*

Patients were group tested at 1.30 p.m. following their treatments. In this part of the experiment, as contrasted with the first, the patients did not receive the first syllable list after their first treatment, the second after their second treatment and so on. In fact the experiment was arranged in such a way that

any list could follow any treatment. Patients were also tested one week following their last treatment.

III. RESULTS

The results for the two parts of the experiment will be presented separately.

For Part One, Figure 1 shows graphically the average number of correct responses obtained by the patients following each treatment.

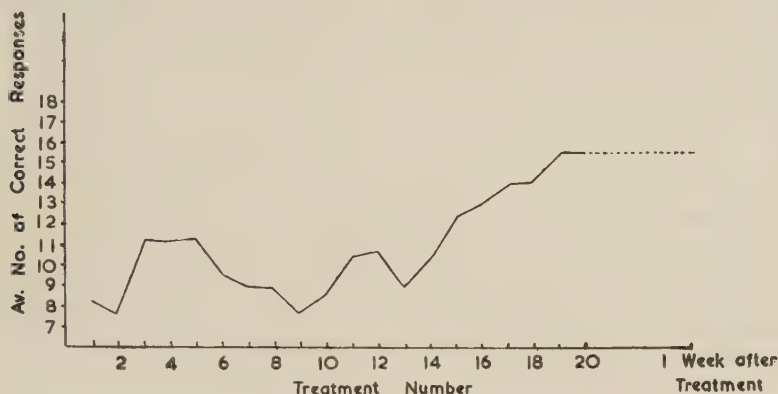


FIG. 1

It will be seen that, following a fluctuation in learning ability during the first thirteen treatments, a gradual improvement follows the fourteenth treatment which continues up to the twentieth.

Performance one week after treatment is similar to and not significantly different from that following the last treatment.

For Part Two, Figure 2 shows the results graphically.

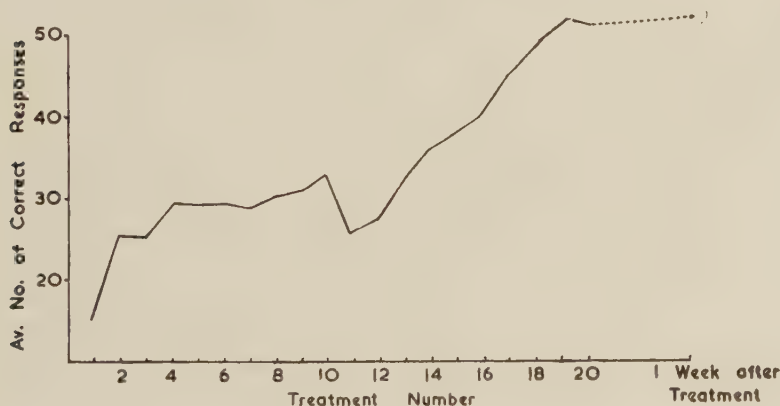


FIG. 2

Here we see a graph which is not unlike the first. Learning ability fluctuates during the first eleven treatments, but the twelfth is followed by improvement which is maintained up to the nineteenth, the twentieth being slightly though not significantly worse than the nineteenth. As before, learning scores one week after treatment are not significantly different from those following the last treatment.

IV. DISCUSSION

We may first consider the first part of the experiment. The graph presented in Figure 1 indicates that the relationship between the number of the treatment and the ability to learn is non-linear. We must however exercise caution in interpreting this finding for the following reason. When the patients received their first E.C.T. they were subsequently tested on syllable list number one and treatment number ten was followed by list number ten and so on. It is possible therefore that the curve in Figure 1 is an artefact due to the lists of syllables being of unequal difficulty. That this is not the explanation is suggested by the following graph (Fig. 3) which shows the association values of the different lists (Glaze, 1928).

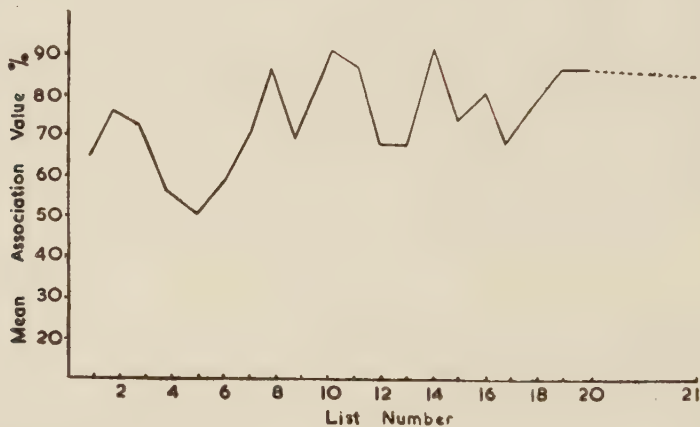


FIG. 3

The association values can be regarded as estimates of the difficulty values of the lists, a list having a high association value being more easily learned than one having a low association value. If the graph in Figure 1 could be accounted for in terms of the difficulty values of the lists we should see some resemblance between Figures 1 and 3. This is clearly not the case.

In Part Two of the experiment the difficulty values of the lists have been largely eliminated. In this part it does not follow that patients who have received their first or tenth treatments will be tested on lists numbered one and ten respectively. On the contrary, a knowledge of which treatment has been given tells us nothing about the number of the syllable list which has been used. Figure 2 shows that the progress of the curve of learning ability is not unlike the curve in Figure 1. In the case of both curves the last eight or so treatments are accompanied by improvements in learning efficiency, which build up to a peak after the nineteenth or twentieth treatment, which has been maintained one week later. It is interesting to note that the final curve of improvement comes at a time when the frequency of treatment has been decreased. Clinical experience suggests that the curve may not rise in this fashion if the frequency of three treatments per week continued.

The fact that the two graphs are not identical requires some comment. It should be remembered that the two groups of patients were extremely small, and also that the test of learning ability was not the same in the two parts of the experiment. It is not possible, from the present data, to explain the discrepancies between the two curves of learning, particularly those occurring

earlier in the course of treatment. They may be due to chance factors, or they may be due to the change in the test. The more likely of the two possibilities would appear to be that of chance factors in view of the correspondence between the two curves after the twelfth treatment. The slight discrepancy following the nineteenth treatment is considered to be due entirely to chance factors.

V. SUMMARY AND CONCLUSIONS

The results of a learning test given throughout a course of twenty E.C.T.s do not suggest that the amount of psychological impairment increases with the number of treatments. If the treatments are spaced out as they are in the present experiment, a patient is able to learn more effectively as the course of treatment continues.

VI. ACKNOWLEDGMENTS

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CONTROLLED TRIAL OF STRAIGHT AND MODIFIED ELECTROPLEXY

By

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IN a previous paper (Seager, 1958) I described a retrospective examination of the records of patients who had been suffering from depressive illness and who had received electroplexy, with or without an anaesthetic or relaxant drug. The results of that survey suggested that patients who received unmodified E.C.T. were in hospital for a shorter period, received fewer treatments and were more likely to remain well than those treated with modified E.C.T. Recognizing that the method of retrospective evaluation could give rise to many errors which would affect the results, I have now carried out a controlled trial of these treatments. The aim of the trial was to ascertain any difference between the results of modified and unmodified electroplexy, and if so, to find out which factor or factors were responsible for the difference.

METHOD

A number of doctors in the hospital kindly agreed to co-operate in the trial. Once a doctor decided there was no reason why one of his patients should be restricted to a particular type of electrical treatment, the patient was allocated on a random basis to one of three groups. Any patient requiring electrical treatment was included in the allocation, but after the patient was discharged only those patients diagnosed as suffering from a depressive illness were assessed—thus all schizophrenic, schizo-affective and manic states were excluded. It was felt that in this way difficulties concerning change of diagnosis during the stay in hospital were minimized, though it resulted in groups being unequal in number.

The types of treatment given were unmodified E.C.T. and E.C.T. modified with thiopentone and suxethonium bromide as described in the previous paper, while a third group of patients received thiopentone 0·2 Gm. alone, prior to the E.T.C.

There was no set number of treatments, this being decided by the doctor in charge of the case according to his usual practice. On discharge, a final diagnosis was made, and the number of treatments noted, as well as the duration of the course of treatment and the period of convalescence. The clinical state of the patient on discharge was also noted, restricting assessment to the three standard terms Recovered, Relieved or Not Improved.

Patients were seen at the follow-up clinic or visited in their homes six months after discharge from hospital to assess progress.

Five categories were recognized:

- (a) Symptom free—patient back at work or carrying out normal household duties.

- (b) Minor symptoms only—able to continue with usual occupation but requiring simple psychotherapy or symptomatic treatment from general practitioner or psychiatrist.
- (c) Relapse—return of original symptoms but not to sufficient degree to require return to hospital—usually means patient is receiving out-patient electroplexy.
- (d) Re-admission to hospital.
- (e) Suicide.

RESULTS

One hundred and seventy-three patients of varying diagnosis were included originally in the trial. Of these sixteen were withdrawn during the trial because the particular treatment proved unsuitable—the usual reasons were that patients receiving injections had poor veins or patients not receiving the relaxant drug developed back pain or bony injury.

A further 39 patients were withdrawn after completing the trial because the diagnosis was not that of depression. This left a total of 118 patients on which results are available. The grouping of the patients according to type of electroplexy is shown in Table I.

TABLE I
Number of Patients in Different Treatment Groups

	Unmodified E.C.T.	E.C.T. Modified by Thiopentone Alone	E.C.T. Modified by Thiopentone and Suxethonium	Total
Original number of patients in trial	54	49	70	173
Withdrawn during trial because of incomplete course ..	5	7	4	16
Withdrawn at end of trial because of diagnosis	14	15	10	39
Patients remaining in trial ..	35	27	56	118

The numbers of each diagnosis falling into the three treatment groups are shown in Table II.

TABLE II
Number of Patients in Each Diagnostic Group Receiving the Different Types of E.C.T. Treatment

Diagnosis	Unmodified E.C.T.	E.C.T. with Thiopentone	E.C.T. with Thiopentone and Suxethonium
Manic depressive psychosis (depressive phase)	16	14	22
Involutional depression	4	5	8
Neurotic depression	15	8	26
Total	35	27	56

The periods of time considered important were the duration of stay in hospital from the day of the first treatment, the duration of the course of treatment and the period of convalescence after the last treatment until discharge, as well as the total duration of stay in hospital. The average length of each period for each diagnostic group receiving the three types of treatment is shown in Tables III to VI.

TABLE III

Average Stay in Hospital from Day of 1st Treatment

					Unmodified	Modified by Pentothal	Modified by Thiopentone and Suxethonium
					Days	Days	Days
Manic depressive psychosis (de-							
pressive phase)	..	..	..	..	48.4	34.4	45.0
Involucional depression	..	..	..	..	35.5	22.6	39.6
Neurotic depression	..	..	..	..	48.4	40.6	48.9
All patients	..	..	..	..	46.9	30.6	46.1

TABLE IV

Average Number of Days Spent on Treatment

					Unmodified	Modified by Pentothal	Modified by Thiopentone and Suxethonium
					Days	Days	Days
Manic depressive psychosis (de-							
pressive phase)	..	..	..	..	30.3	16.7	21.0
Involucional depression	..	..	..	..	17.3	12.2	16.9
Neurotic depression	..	..	..	..	24.9	20.9	24.0
Total	..	..	..	..	26.5	17.1	21.8

TABLE V

Average Period of Convalescence in Hospital from Day of Last Treatment to Discharge

					Unmodified	Modified by Pentathol	Modified by Thiopentone and Suxethonium
					Days	Days	Days
Manic depressive psychosis (de-							
pressive phase)	..	..	..	..	17.8	17.6	23.2
Involucional depression	..	..	..	..	18.3	8.0	17.8
Neurotic depression	..	..	..	..	22.7	22.1	25.0
Total	..	..	..	..	19.9	17.2	23.3

TABLE VI
Average Length of Stay in Hospital

	Unmodified Days	Modified by Pentothal Days	Modified by Thiopentone and Suxethonium Days
Manic depressive psychosis (depressive phase)	63.1	42.9	53.4
Involucional depression	44.8	40.6	46.3
Neurotic depression	68.3	55.8	63.6
Total	62.9	46.1	57.5

The average number of treatments received is shown in Table VII.

TABLE VII
Average Number of Treatments Received

	Unmodified	Modified by Pentothal	Modified by Thiopentone and Suxethonium
Manic depressive psychosis (depressive phase)	6.4	5.9	6.0
Involucional depression	5.8	4.4	5.9
Neurotic depression	6.1	5.9	6.6
Total	6.2	5.6	6.3

T-tests showed that there was no significant difference between the means of the groups, either in duration of hospital stay or number of treatments, though as will be seen on inspection there is a tendency for lower figures in the group of patients who received the anaesthetic alone.

Considering the state of the patient on discharge (Table VIII), the relationship between the three groups was examined by chi-square and it was found

TABLE VIII
Condition of Patients on Discharge from Hospital

	Unmodified E.C.T.			E.C.T. Modified with Thiopentone			E.C.T. Modified with Thiopentone and Suxethonium		
	Re-covered	Relieved	Not Improved	Re-covered	Relieved	Not Improved	Re-covered	Relieved	Not Improved
Manic depressive psychosis (depressive phase) ..	6	10	0			0	13	9	0
Involucional depression ..	3	1	0	3			5	3	0
Neurotic depression ..	2	13	0	5	3	0	5	20	1
Total	11	24	0	16	10	1	23	32	1

that there was a significant difference between the three groups ($\chi^2=6.0$, $P=0.05$). To find out whether the three groups were significantly different from each other or paired in any way, chi-square tests were carried out on each result compared with each of the other two separately. It was found that there was no significant difference between the unmodified and fully modified E.C.T. ($\chi^2=1.4$ and $P>0.1$) or between the modified and the thiopentone alone group ($\chi^2=2.4$, $P>0.1$). Between the unmodified and the thiopentone modified treatment there was a significant difference ($\chi^2=4.8$, $P<0.05$).

REFUSAL OF TREATMENT

Once a patient had commenced his course of E.C.T. refusal of any particular treatment was noted. Patients who never embarked on the course were not included. This was because their refusal was based not on experience of the treatment, but on hearsay or else a general fear of electricity, anaesthetics or loss of consciousness, while here. I was trying to find out whether any particular method of administration was more frightening than another. Two patients in the unmodified, two in the thiopentone modified and three patients in the thiopentone and relaxant modified refused further treatment. There was, therefore, no indication of undue fear on the part of the patient of one or other type of treatment, at least as determined by the number of patients who refused further treatments. No account was taken of the degree of apprehension, or the amount of persuasion necessary to enable treatment to be given as these were not capable of objective evaluation.

FOLLOW UP

Of 118 patients who were included in the trial, no information was available on fourteen of these after six months. The remaining patients were examined and the results are shown in Table IX.

TABLE IX
Condition of Patients Six Months After Discharge from Hospital
Unmodified E.C.T.

Diagnosis	Symptom Free	Minor Symptoms	Relieved	Re-admitted	Suicide
Manic depressive psychosis (depressive phase) ..	6	5	2	2	0
Involuntional depression ..	1	3	0	1	0
Neurotic depression ..	2	7	2	1	0
Total	9	15	4	4	0

E.C.T. Modified with Thiopentone

Diagnosis	Symptom Free	Minor Symptoms	Relieved	Re-admitted	Suicide
Manic depressive psychosis (depressive phase) ..	3	7	1	2	0
Involuntional depression ..	1	1	0	2	0
Neurotic depression ..	3	3	0	1	1
Total	7	11	1	5	1

E.C.T. Modified with Thiopentone and Suxethonium

Diagnosis	Symptom Free	Minor Symptoms	Relieved	Re-admitted	Suicide
Manic depressive psychosis (depressive phase) ..	11	5	1	4	0
Involuntional depression ..	3	1	1	2	0
Neurotic depression ..	4	14	1	0	1
Total	18	20	3	6	1

For the sake of simplicity the follow-up results have been grouped into two; in the "improved" group are those patients who were symptom free or

with minor symptoms only, and in the "relapsed" group those who required further electroplexy either on an out-patient or in-patient basis; also there were two suicides. Applying chi-square to these results, it is found that there is no significant difference between the follow-up results of the three forms of administering electroplexy ($\chi^2=0.5$; $P>0.5$).

DISCUSSION

Barker (1959) has described the various methods of carrying out the common treatment of electroplexy in a number of British hospitals. He comments on the diversity of methods and points out how little we know of the advantages and disadvantages of them in terms of results and of complications.

There has recently been published a controlled trial of modified and unmodified electroplexy (Havens, 1958) which shows that the results of the two methods of treatment are similar, while the disadvantages of unmodified treatment—restlessness after treatment and high morbidity due to fractures—outweighs its advantages of simplicity and safety; this is particularly so as the hazards of modified electroplexy have been reduced by use of short-acting relaxant drugs.

This paper confirms the findings of Havens in so far as it shows that the results of treatment with unmodified E.C.T. and E.C.T. modified by an anaesthetic and relaxant are essentially similar in respect to number of treatments, length of stay in hospital, period of convalescence after treatment and condition at the time of discharge and after six months.

A third group of patients were included in the trial in order to try and demonstrate whether either the anaesthetic or relaxant drug were responsible for any differences between the two groups.

Observation of the results shows a tendency for patients who received thiopentone alone to have a better prognosis than the other two groups. This tendency does not reach a level of statistical significance; t-tests show no significant difference between the various means of the treatment groups, while chi-square tests of the follow-up results show that the differences found in the various treatment groups could well be explained on the basis of chance alone.

When one studies the state of the patients on discharge, however, one finds that there is a significant difference between the results of the thiopentone group and the unmodified electroplexy. The reason for this is not apparent. One must remember that all statistical examination tells one is that the likelihood of such an event taking place by chance is one in twenty; not that it can never take place, but that it is rare. This may be an explanation of this finding, or it may be due to an unexplained therapeutic benefit of thiopentone; this seems unlikely. Such a benefit would have to be much more apparent before this form of treatment could be recommended. It combines all the disadvantages of the other two forms—high morbidity due to back pain, risk of extravenous injection and other hazards of anaesthesia, without any concurrent advantages.

The finding that electroplexy, whether modified or unmodified, produces virtually identical results, confirms the view that its action is central and that such factors as the products of muscle metabolism are unlikely to play any part in its therapeutic action.

The decision as to whether modified or unmodified electroplexy should be administered is one which must be decided by the clinician who bases his decision on the available facts. He must take into account the undoubtedly

higher morbidity of unmodified electroplexy and weigh this against the risks of anaesthesia, bearing in mind the experience of the person who is to administer the drugs and the nursing staff who must look after the patient after the treatment is given.

It is probably true that most psychiatrists now favour modified electroplexy as the method of choice but there are occasional indications for unmodified treatment, so that it would be unfortunate if it became established that failure to give modified treatment was negligence in law.

SUMMARY

1. A controlled trial of electroplexy was carried out on 118 patients suffering from depressive illness. They were given treatment either unmodified, modified by thiopentone alone, or by thiopentone and suxethonium bromide.

2. There was no significant difference in number of treatments, length of stay in hospital, clinical outcome or follow-up after six months between the unmodified electroplexy and that modified by anaesthetic and relaxant drugs.

3. Comment is made on the improved results produced in patients receiving thiopentone alone prior to treatment.

ACKNOWLEDGMENTS

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THE USE OF CHLORPROMAZINE IN A MENTAL DEFICIENCY INSTITUTION

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UNSTABLE mental defectives in an institution present handling and training difficulties out of all proportion to their number. The following is an account of an attempt to modify or control their behaviour by the use of chlorpromazine.

METHOD

Selection of Patients

Eleven males and 31 females were selected. Of the males 3 were higher grade and 8 lower grade, i.e. idiots and low-grade imbeciles. Of the females 25 were higher grade and 6 lower grade.

The lower grade patients exhibited almost daily one or more of the following—excessive restlessness; outbursts of screaming or animal-like noises; impulsiveness; destructiveness; resistiveness.

The behaviour of the higher grade patients differed quantitatively rather than qualitatively. They were less predictable and controlling them was made more difficult by the empathy that existed between them.

A bout of screaming from an idiot might lead to shouts of “Shut up” from another patient; but an impulsive irritable outburst from a higher grade patient could lead to a cacophony of 7 or 8 screaming female voices.

Controls

As the previous behaviour and history of the patients was known, they acted as their own controls.

Length of Treatment

Of the 11 men 4 had been on treatment from 3–4 years and 7 for 2–3 years.

For the 31 females the figures are as follows: 4 for 3–4 years; 14 for 2–3 years; 6 for 1–2 years; 7 for 6 months–1 year.

It is felt that such a length of time should eliminate temporary improvement due to extraneous factors—such as bus runs and relatives’ visits, etc.

Dosage

Except in urgency and refusal to take tablets, the drug was given by mouth; the dose being gradually increased until there was improvement in the patient’s condition. If initial improvement was not maintained then the amount was increased until a stabilizing dose was found.

For the males the daily dose ranged from 150–300 mg. For the females it was in the 300–600 mg. range, with two exceptions of 800 and 900 mg.

ASSESSMENT OF RESULTS

The results were assessed:

1. From the daily ward books.
2. From regular reports of the senior nursing staff.
3. Clinical assessment.

The standards adopted were:

"Improved"—If the patient could no longer be distinguished from stable defectives of a similar grade on a behaviour basis.

"Slightly Improved"—If episodes became more sporadic or less intense.

"No Change".

"Worse".

Results

			Improved	Slightly Improved	No Change
Male—Higher grade	..	..	2	1	—
Lower grade	..	..	2	5	1
Female—Higher grade	..	..	4	17	4
Lower grade	..	..	—	5	1
			—	—	—
Total	..	..	8	28	6
			(19%)	(66·7%)	(14·3%)

No patients were worse.

Side-Effects

The side-effects encountered were slight. There was no jaundice; no agranulocytosis and no dermatitis in this series.

Most showed drowsiness initially and when the dosage was increased. This was transient in the lower dosages; but was a limiting factor at the top level.

Eight showed photosynthesis and at times facial oedema which responded to antihistamine preparations.

The 7 epileptics in the series carried on with their anticonvulsant medication concomitantly. One female who suffered from infrequent seizures following leucotomy showed serial epilepsy for three days while under treatment—perhaps confirming the view of the epileptogenic properties of chlorpromazine in such patients (Blair and Brady, 1958).

Obesity

Eleven females and 1 male showed a marked increase in weight—6 gained 1 stone; 2 gained 1½ stones; 3 gained 2 stones.

This was not due to an increased appetite—many were gluttonous before and during treatment; nor to decreased activity.

It had no prognostic significance; 3 patients who did not benefit gained a stone in weight.

COMMENT

It is difficult to find a suitable drug that will sedate such patients yet allow them to be ambulant.

As evidence of this the preparations which some of these patients have had, include barbiturates; paraldehyde; rauwolfia derivatives; promazine (Sparine); mepazine (Pacatal); thiopropazate dihydrochloride (Dartalan); prochlorperazine (Stemetil). Three have had E.C.T.

The most effective of these was Stemetil, but this was discontinued because of the high incidence of side-effects.

On chlorpromazine, those patients who improved were more co-operative and less irritable and sullen. They showed a greater interest in their own personal appearance and in the ward activities.

Three of them while on chlorpromazine were allowed out on pass to relatives for a holiday.

CONCLUSION

The conclusion drawn from the results is that chlorpromazine is of value in controlling or modifying the behaviour of unstable mental defectives and in lessening the physical and mental strain on their nurses.

SUMMARY

Forty-two unstable mental defectives who presented gross behaviour disorders were treated with chlorpromazine for periods of up to 4 years. The usual dose ranged from 150 mg.-600 mg. Eight improved; 28 slightly improved; 6 showed no change.

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METHYLPHENIDATE ("RITALIN"): AN ADJUNCT TO PSYCHOTHERAPY

By

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THE authors have independently used drug-aided psychotherapeutic techniques. Some good results were being obtained but we were not entirely satisfied with existing agents. The first few applications of parenteral "Ritalin" appeared promising and prompted the work on which this paper is based.

The literature on drug-aided psychotherapy is considerable. The introduction of barbiturates led a number of psychiatrists to use these drugs in psychotherapeutic interviews (Lindeman, 1930; Wagner, 1933; Stockert, 1935; Horsley, 1936; and Campbell, 1938). Widespread interest in the technique was roused by the successful use of intravenous barbiturates in battle casualties, helping them to re-experience the violent emotions of battle and frequently leading to a relief of anxiety or hysterical symptoms. Sargant and Slater (1940, 1941), Debenham, Hill, Sargant and Slater (1941), Grinker and Spiegel (1943) were pioneers in this field.

As the war progressed, it was found that the more long-standing cases of conversion hysteria abreacted better with an excitatory agent such as ether (introduced by Palmer, 1945), intravenous methedrine (Simon and Taube, 1946), or carbon dioxide (Meduna, 1950). Shorvon and Sargant (1947) advanced the view that excitatory abreaction affords an analogy to observations made by Pavlov on dogs (Pavlov, 1942; Frolov, 1938), who found disruption of recently formed conditioned behaviour patterns when dogs were excited to the point of collapse, that is, cortical inhibition. In this state Pavlov found reconditioning possible only in dogs he had previously regarded as endowed with a stable nervous system, that is animals that were upset only with difficulty and maintained a healthy balance between excitation and inhibition. Shorvon and Sargant similarly found that in clinical practice patients were usually in an impressionable, suggestible state after a successful abreaction, but only those with basically stable personalities would retain and benefit from newly-implemented ideas.

It thus became evident soon after civilian practice came to the fore again, that treatment aiming only at excitatory abreaction would not be as useful in psychoneurotics whose symptoms were based less on isolated traumatic

incidents than on difficulties and conflicts within the personality. Shorvon and Sargant (1947) and Sargant and Slater (1954) found that severe chronic conversion hysterics and chronically anxious patients were frequently made more unstable by this procedure. In a discussion on abreaction, Garmany (1953) denied its value altogether, feeling that it may do harm by "stimulating the id when what the patient needs is support for the tottering super-ego". Obsessional neurotics were found to be entirely unsuitable for either abreaction as they are much too rigid, and because of their tendency to intellectualize emotional experiences (Shorvon and Sargant, 1947; Shorvon, Rook and Wilkinson, 1950; Sargant and Slater, 1954).

Carbon dioxide was used with some success as an abreactive agent following Meduna's observations (Freeman, 1952; Jackman and Schorr, 1952; Moriarty, 1952; Clark, 1954). However, Hawkins and Tibbitts (1956), using a group of controls to whom compressed air was administered instead of carbon dioxide, found that there was no significant difference in the clinical results between the two groups. Also Shorvon (1953) felt that obsessionals and tension states may be made worse by carbon dioxide.

Intravenous methedrine as an aid to psychiatric diagnosis and therapy was introduced by Simon and Taube (1946). They drew attention to the facilitation of the flow of talk, during which patients disclosed previously unobtainable material, including latent delusions. Levine (1948) had further experience with this drug in 75 cases, and Shorvon, Rook and Wilkinson (1950) described their results in dermatological patients. The latter authors found that particular patients with obsessional trends, who did not abreact with ether, showed decrease in reserve and euphoria, punctuated by emotional outbursts. They concluded that the total effect is one of a prolonged moderate abreaction. Ling and Davis (1952) at Roffey Park and also Straker (1953) and Yanekian (1954) in America, have reported on methedrine interviews. They are agreed that this drug has an advantage over intravenous barbiturates and ether, in that the session takes place in full consciousness, the material so obtained being later available for interpretation. Painful and traumatic experiences were often abreacted violently with methedrine, accompanied by relief of tension. A facilitation of transference emotions frequently occurred. Further experience with methedrine led Shorvon (1953) to confirm its usefulness, particularly where a hysterical component was present, but like other authors he encountered some undesirable side-effects. These included dizziness, palpitations, nuchal and occipital pain, dryness of mouth and prolonged insomnia for one or two subsequent nights. Barbiturates often did not relieve this tension and restlessness, but on occasions served to precipitate a further emotional outburst. A prolonged hysterical reaction was noted in several patients. Brussel, Wilson and Shankel (1954) recorded one case of convulsions after methedrine interview, associated with theta bursts in the electroencephalogram lasting 48 hours.

More recently, two further compounds have been tried as adjuncts to psychotherapy. Hydroxydione (Presuren) was briefly described as being potentially valuable in eliciting early repressed memories (O'Flanagan and McGuinness, 1958), but in the experience of one of us (J.A.K.) the technique of its administration presents difficulties.

The second of these, methylphenidate (Ritalin), is the subject of the present communication.

Meier *et al.* (1954) demonstrated the properties of this drug in mice and dogs in doses of 0.5-5.0 mg./kg. of body weight. It increased psychomotor activity of shorter duration than that produced by amphetamine and the median

lethal dose was found to be relatively high, i.e. 30 mg./kg. of body weight when given intravenously. Barbiturates and other narcotics had a weak antagonistic action. The autonomic effects of Ritalin in animals were found to be an increase in respiratory rate and depth and a 10 per cent. rise in blood pressure and pulse rate. Neither peripheral vasoconstriction nor mydriasis occurred.

In human subjects Drasdo and Schmidt (1954) found that mental sluggishness induced by phenobarbitone was counteracted by Ritalin. Ferguson (1955) Ferguson *et al.* (1956), Ferguson and Funderburk (1956) and Ayd (1956) successfully counteracted with Ritalin the lethargy and Parkinsonism occurring in patients undergoing reserpine and chlorpromazine therapy. Cole and Glees (1956) and Plummer *et al.* (1957) compared the effects of Ritalin and amphetamine in monkeys. They found that Ritalin, unlike amphetamine, did not disturb sleep, but was less potent in increasing psychomotor activity. They postulate that the site of action of both drugs lies in the sympathetic centres of the posterior hypothalamus.

Therapeutic uses of oral Ritalin have been varied. Carter and Maley (1957) report on parenteral Ritalin as an alerting agent in cases of over-dosage with reserpine, and in debility after infections. Graham (1957) and Morpurgo (1957) applied Ritalin as a stimulant in aiding arousal after anaesthesia, and Ivey (1958) in coma following attempted suicide. Natanshon (1956) found the drug valuable in general practice, in treating convalescent patients and in the chronic sick and the aged.

In psychiatric practice oral Ritalin has been widely used in relieving depression (Stier, 1955; Davidoff, 1957; Jacobson, 1956). Jochheim (1955) reported on its use in psychoneurotic disorders and Geller (1955) in reactive depression and chronic fatigue, but the latter found the drug valueless in endogenous depressions. Pennington (1957) reports favourably on Ritalin in restoring verbalization and interest in chronic mental patients. Robin and Wiseberg (1958), in a controlled study with out-patients suffering from depression, found no significantly superior results with Ritalin than with inert tablets. Zimmerman and Burgemeister (1958) had some success with retarded children exhibiting behaviour disorders, particularly where the patients were listless and depressed.

All investigators stress the mildness of side-effects as compared with amphetamine, and the absence of "let-down", "rebound depression" or tendency to habituation with Ritalin. Increases in blood pressure and pulse rate are variably reported. Jochheim (1955), Ferguson *et al.* (1956) found no pressor effects in their patients, and Pennington (1957) comments that increases in blood pressure are rare in normotensive or hypertensive patients, but advises caution in the presence of gross arteriosclerosis. However Bartlet (1958) reports rises of up to 80 mm. systolic and 40 mm. diastolic pressure after intravenous Ritalin within 15 to 30 minutes of the injection.

The application of intravenous Ritalin as an aid to psychiatric diagnosis and therapy has been described by Hartert and Browne-Mayers (1958), who used doses from 20 to 40 mg. in 9 psychiatric patients, mainly alcoholics. There followed marked euphoria and talkativeness within five to ten minutes, enhanced introspection and critical self-evaluation, with consciousness undisturbed. They observed increases in systolic blood pressure, occasionally marked, less marked increases in diastolic readings, and considerable raising of the heart rate, all recorded during the interviews. They advocated careful evaluation of the cardiovascular system in every patient undergoing this procedure, but conclude that Ritalin promises to be a useful agent in psychotherapy.

Freed (1955) had observed that patients receiving oral Ritalin showed increased pressure of talk. He gave 10 to 15 mg. of Ritalin intravenously to 20 patients (Freed, 1958). In 14 verbalization was increased, markedly so in 5. One patient revealed repressed material not previously obtained with other drugs. The author remarks that compared with the previously used combination of methedrine and amytal the abreaction was less intense, the patient being less euphoric but releasing more aggression. The interview was more easily managed and side-effects much less disturbing, particularly, there was no subsequent insomnia.

Masciangelo (1957) reported facilitation of thought processes and pronounced abreaction in 50 neurotic patients given 20 mg. of intravenous Ritalin. Tedeschi and Vella (1957) believe that with this procedure it is possible to overcome emotional tension by reinforcing the functioning of the patient's consciousness. Bartlet (1958) recently tried with success to counteract the side-effects of reserpine therapy in schizophrenics by means of a single intravenous administration of Ritalin followed by oral therapy. He also reports marked temporary improvement in two depressed non-schizophrenic patients after 20 mg. of Ritalin intravenously.

MATERIAL AND PROCEDURE

Our series embraces 52 patients of whom 22 were treated in psychiatric out-patient clinics, 11 as in-patients in a mental hospital and the remaining 19 in a psychiatric unit attached to a general hospital.

Each case was treated by one of us separately. The selection of material was based on the usual indications for a drug-aided interview, viz.:

- 1. to increase rapport and put the patient at ease;
- 2. to overcome inhibitions and facilitate the flow of talk;
- 3. to uncover pre-conscious or unconscious material and increase the patient's receptiveness to its discussion and interpretation;
- 4. to aim at an abreaction proper, i.e. "the excitement obtained during the discharge of emotionally laden ideas and incidents" (Shorvon, Rook and Wilkinson, 1950).

Psychiatric diagnosis was not used as the criterion in the selection of patients for treatment. It was found, however, that the cases treated fell into the following groups:

Affective disorders (including tension states)	..	..	..	..	..	..	23
Sexual maladjustments	..	..	..	..	..	..	6
Hysteria	..	..	..	..	..	..	9
Psychosomatic disorders	..	..	..	..	..	..	4
Psychopathic personality	..	..	..	..	..	..	2
Obsessive compulsive neuroses	..	..	..	..	..	..	3
Schizophrenia	..	..	..	..	..	..	2
Mixed neuroses	..	..	..	..	..	..	3

There were 27 male and 25 female patients. The ages ranged from 13 to 58, with 6 patients in the second decade of life, 18 in the third, 11 in the fourth, 15 in the fifth and 2 in the sixth decades.

Twenty mg. of Ritalin was dissolved in water and injected intravenously. In only 1 case (39), where continuous clonic movements of the patient made intravenous injection difficult, the preparation was given intramuscularly with a satisfactory, though delayed, response. In most cases the

injection was given within 30 seconds, though in a few of the earlier cases within 2 minutes. The injection was administered with the patient lying supine on a bed or couch, usually in his own clothing but with shoes removed and with tight garments loosened; dentures were not removed. A few cases were conducted with the patient sitting in an easy chair and this position seemed satisfactory too. No special precautions, apart from routine physical examination, were taken. At first the patient was discouraged from having a meal for several hours prior to the treatment but experience showed this precaution to be superfluous. In the case of out-patients, arrangements were made for a responsible relative to accompany the patient home after treatment, but we are inclined to feel that this step, too, is unnecessary.

In 43 patients one interview with Ritalin was found sufficient. The 9 remaining patients received between them 2 and 21 treatments. Nine patients were, at various times, treated with Ritalin and alternatively or in combination with one or more of the following agents: pentothal, Presuren, nitrous oxide, ether.

RESULTS

In 49 cases Ritalin induced a significant increase in the flow of talk. Only in a few cases was it so great as to interfere with the patient's capacity to express himself clearly. When this did occur the patient would sometimes spontaneously remark "Do I make sense?" or "Does this sound coherent?"

Some patient showed almost compulsive circumstantiality, often irrespective of whether the subject under discussion was emotionally charged or not. At times it was found a hindrance to the smooth progress of the session, but in the majority of cases it threw useful light on the patient's attitudes and personality. One patient (38), who had Ritalin repeatedly, developed the ability to realize this herself and to abandon, or at least to correct, excessive or irrelevant detail in a way that she never did in unaided psychotherapy or psychotherapy with methedrine. It was found that the more unintelligent patients often lost the thread of the conversation and had to be brought back to the subject.

In 10 cases there was a marked emotional discharge within a few minutes of the injection being given. These patients exhibited psychomotor restlessness with uncontrollable sobbing ("A" in the Table). In 9 cases emotional discharge also followed within a few minutes of the injection but was less dramatic; it was characterized by transient tearfulness, slight increase in tension and was frequently followed by a sense of relaxation and well-being ("B" in Table). In 8 cases emotional manifestations of varying intensity, ranging from sadness and mild excitement to uncontrollable crying and marked psychomotor activity, developed at some time during the interview, and were related to the emergence or discussion of traumatic experiences and painful thoughts ("C" in Table). It is doubtful if these emotional manifestations can be attributed solely to the action of Ritalin, but we consider that Ritalin had facilitated them. In 4 cases a sudden attack of weeping, excitement and panic occurred at the end of the interview when the psychiatrist was about to leave the room, usually about one hour after the injection had been given ("D" in Table). In the remaining 21 cases no increase in the emotional tension was observed at any time during or at the end of the interview ("O" in Table). In patients who had repeated interviews, when emotional discharge occurred, it tended to occur in harmony with the expressed thought content, and not necessarily at the same

point in time during each interview, i.e. it was probably the result of interview development rather than the stage of Ritalin metabolism.

The procedure was considered to be of diagnostic value in 27 cases, of therapeutic value in 7 cases, and of both diagnostic and therapeutic value in 12 cases. In the remaining 6 cases the procedure was considered of no help. Each therapist assessed his own cases.

No major physical complications were observed during or following the administration of intravenous Ritalin in our series. All but one of our out-patients were able to leave the clinic from one to two hours after receiving the injection and most in-patients returned to their respective wards without need for special care. Only 4 in-patients required subsequent supervision and sedation. No insomnia was reported even when treatment was given in the later afternoon. A few patients complained of loss of appetite for several hours after the procedure. One patient complained of headache and 2 of slight palpitation during the interview. Ten patients remained emotionally labile for several hours after injection; in 4 patients this was apparent to the casual observer, in the others it was noticed by the therapist. In no case was a spontaneous complaint made by the patient.

CASE REPORTS

Three fairly typical examples of Ritalin interviews are given below:

CASE NO. 20: MALE: AGE 18: SINGLE

Periodic attacks of unconsciousness of 2 years' duration.

History

He was labelled epileptic and had received anti-convulsant therapy. The patient came from a very poor family and was subjected to severe emotional trauma at the age of 9, when his younger brother, to whom he was most attached, was killed in his presence in a road accident. He subsequently felt responsible for this accident and has since then suffered from recurring anxiety symptoms and nightmares. His father was a chronic invalid and the patient was the only breadwinner in the family, there being a good deal of financial stress in the home. The patient started work as a shop assistant, but after two years left in a fit of temper and was very unsettled in the subsequent job. While there he stole some money and was later dismissed. His "blackouts" commenced some time after the trouble at his first place of employment. He was rejected from Army service because of his attacks which caused him much disappointment as he wished to get away from home. Thereafter the frequency of the attacks increased. He was referred to a neurologist, who was doubtful whether the attacks were truly epileptic and admitted him for investigation. Neurological examination, a radiograph of the skull and the electro-encephalogram were normal.

Ritalin Interview

He talked under great pressure and with compulsive attention to circumstantial detail, often losing the thread of the conversation. There was marked tremor throughout the interview and obvious show of emotion while recounting the brother's death at great length.

Subsequent Progress

There were no ill-effects on the day of the injection. The patient walked unaided back to another ward and slept well the same night. Several of his fainting attacks were witnessed by the staff who suspected that they were not epileptiform. This observation, together with the result of the Ritalin interview, established the diagnosis of functional fainting attacks, and all anti-convulsant therapy was stopped. After some further talks he was discharged home but subsequently applied to the Matron for training as a S.E.A.N. and is at present working satisfactorily in the chronic wards of this hospital, having had no further attacks.

Comment

A great deal more information about this patient's personality, attitudes and emotions was obtained during the Ritalin interview than during the previous talk with him. It was of great assistance in coming to a positive diagnosis.

CASE NO. 38: FEMALE: AGE 44: MARRIED

Severe obsessional neurosis with hand-washing and dirt-phobia.

History

Strictly brought up by an unstable but house-proud mother and a short-tempered father. She grew up in the days of severe unemployment; when she became employable had to go into lodgings in order to qualify for unemployment assistance. Always very tidy and very clean about her person. After marriage her phobia of dirt became increasingly severe so that her time became completely occupied with superfluous activity and her house became a filthy chaos. This, among other factors, led to the break-up of her marriage.

Psychotherapy was tried with little improvement; her emotional problems were intellectualized and she presented considerable resistance and inhibition.

Administration of *intravenous methedrine* resulted in a torrent of words impossible to direct and maintained for over 24 hours. In the early stages she was extremely aggressive and paranoid, so much so that doubts were raised whether she was not, in fact, a paranoid schizophrenic—though the subsequent course of her disorder has not confirmed this suspicion.

With *pentothal* there was little response and no significant progress.

Ritalin Intravenously

Marked relaxation and release of tension, and good rapport was engendered, with recovery of forgotten incidents, real and fantasied, accompanied by marked abreaction. The capacity to criticize herself was improved resulting in reduction of symptoms and ability to overcome them when they reappeared. Anamnesis was formerly excessively detailed and almost ritualistic. With Ritalin she became able to cut short her own defensive digressions (recognizing their true nature!) and spontaneously progressed with the main deeper theme.

Subsequent Progress

The patient, still under treatment, feels better and shows improvement in her relationship with others. She is able to make a fairly realistic appraisal of her situation and is beginning to make positive plans for the future.

Comment

This was a difficult psychiatric problem, almost given up as incurable after attempts at psychotherapy and abreaction with methedrine and pentothal. With the aid of Ritalin psychotherapy made considerable progress, resulting in alleviation of the patient's symptoms.

CASE NO. 48: OUT-PATIENT: FEMALE: MARRIED AGE 23

History

Referred by her general practitioner with depression and a history of recent suicidal attempt. She was intelligent and before her illness keen and active, but anxious and very insecure. When 18 she married a man nearly twice her age in order to escape her home environment. There is one child. She soon separated from her husband and now again lives with her parents. She fell in love with a Turkish student but realizes that the prospects of marriage are remote. Being very inhibited the patient found it very difficult to talk about her numerous difficulties and conflicts, especially concerning her sexual life. For this reason a drug-aided interview was recommended.

Ritalin Interview

Within a few minutes of the injection the patient became talkative and relaxed, smiled and said that she was "feeling fine". After a few general subjects she started talking spontaneously about her feelings of hostility and guilt at home and the hopelessness of her love. There was copious weeping, with a flood of material of which she had been aware but normally avoided thinking about it. Another outburst of weeping took place some 20 minutes later.

Comment

This case illustrates the increased flow of talk and emergence of relevant material. It produced considerable emotional discharge of the type marked "C" on the Table. The procedure was of value both from a diagnostic and therapeutic point of view.

DISCUSSION

In general, the patients expressed pleasure in the sensation of relaxation and in their ability to verbalize and to express their feelings after the injection of Ritalin. They felt their thoughts came more readily and they saw past events and relationships more clearly. Ideas emerged of which the patient had only been dimly aware. There was a tendency to subsequent resubmergence of factors which were painful and unpleasant; this is, of course, a commonplace in

psychotherapy, with or without drugs, but we feel there is less tendency for it to occur with Ritalin than with other agents. Many cases reported turning over in their minds material discussed at the interview, some reporting it spontaneously, some on questioning. None was disturbed by this phenomenon and, indeed, many were pleased, feeling that it was profitable. Several contrasted it with the feelings of disturbance or of "barrenness" between interviews, prior to the use of this drug. Our experience confirms Masciangelo's (1957) that the initial Ritalin interview facilitates later non-drug-aided psychotherapy.

We saw no evidence of true dissociative phenomena with Ritalin, the patient being in a state of unimpaired consciousness throughout. No patients appeared dazed or felt any alteration in their contact with reality; none asked questions such as "Where am I?" or "What is happening to me?" In this we found a distinct difference from methedrine or pentothal interviews, during which dissociative and twilight states occur frequently, the patients afterwards either having amnesia for the episode or realizing that something very unusual had happened to them. With Ritalin, however, there was one case (32) of gross behaviour disorder during and following the interview necessitating heavy sedation. This patient was clinically considered an immature psychopath and was under observation following a hysterical fugue. While under the influence of the drug his behaviour became offensive, grandiose, hyperactive, and he lost all judgment and sense of propriety.

In considering the usefulness of Ritalin in different diagnostic categories we feel that the indications are roughly the same as for drug aided interviews in general as set out in the section on procedure. A word of caution is necessary in cases of overt depression, where occasionally Ritalin interviews served to heighten the patient's awareness of his morbid ideas and conflicts, and in consequence the depression deepened. But the majority of our depressed patients felt greatly relieved after interview. In 3 cases latent depression was uncovered and later successfully treated with electro-convulsant therapy.

Two obsessional patients (33 and 38) abreacted instantaneously. The stream of talk became more profuse in one than in the other, but both showed a degree of elation which they related to the relief of tension. There was no excessive, uncontrollable increase in the flow of talk amounting to disorganization of speech, such as we have observed in obsessional patients with methedrine, and in fact, in one of the two cases under discussion.

Two latent psychotics (5 and 47) were investigated, resulting in the admission of previously denied hallucinations or delusions, and enabling the diagnosis to be made much more accurately and more rapidly than would otherwise have been possible.

Three patients who were strongly suspected of withholding relevant information still exerted strong resistance during the Ritalin interviews. It was felt that they were holding back something of importance which they had, from the outset, no intention of divulging. Two of these cases (6 and 19) were also given methedrine and pentothal in separate sessions, but with no more success. Ritalin, therefore, does not appear to break down conscious barriers any more than do the other drugs.

Some of the more uninhibited garrulous patients became extremely verbose without concomitant emotional release. Ritalin seems to have less value in such cases though a few useful points were elicited.

Emotional discharge does not appear to be a prerequisite for success; for example, in Case 21, where the interview was of definite therapeutic value, no frank emotionalism occurred. The patient was most relieved and grateful

to have been allowed to talk at such length and improved rapidly after the interview. Excitatory abreaction as such is, in our view, of value in a very selected group of cases, for example, battle casualties and neurotic reactions following profound psychic trauma. Ritalin is not as powerful in this respect as ether or methedrine. Emotional release of varying intensity did occur in a total of 31 out of our 52 cases. We have no comparable data for methedrine interviews, but our clinical impression is that it occurred more frequently and with greater intensity with the latter drug. There appears to be a group of people who, perhaps because of their constitutional endowment or their low threshold for emotional display, readily respond with tears to the interview situation, especially one involving injections. Others, with a high threshold for emotional release, undoubtedly undergo a profound experience during the Ritalin interview, in which facilitation of thought and verbalization occur with subjective relief and therapeutic benefit, without necessarily showing overt emotion. Such patients frequently remark subsequently that they have never been able to talk so freely about intimate personal matters, and express their sense of true gratitude for being allowed to do so.

We find that Ritalin interviews tend to terminate spontaneously under one hour, a great convenience in out-patient work, whereas methedrine interviews are notoriously difficult to break off.

Unpleasant side-effects were few, and although we have recorded in the section on results all complaints elicited by questioning, spontaneous complaints were noticeably rare. There was never as much distress as after methedrine. One patient (30) suffering from paroxysmal tachycardia had an attack while waiting for the interview and complained of palpitations when she entered the room. This attack subsided and the injection was given; the pulse rate rose rapidly from 80 to the range 140 to 160 beats per minute and remained at this level throughout the interview. There was no emotional discharge at this session. The patient had no subjective palpitations while under Ritalin and denied this symptom when specifically questioned about it. In many cases, similarly, though the pulse rate undoubtedly increased, this only rarely caused subjective discomfort; perhaps it is overshadowed by the feeling of relaxation and pre-occupation with the interview itself.

Noteworthy, too, we feel, is the absence of any sense of "let-down" or rebound depression in all our cases.

Referring to methedrine, Straker (1953) and Brussel, Wilson and Shankel (1954) expressed the view that no alteration of awareness or impairment of judgment occurs. However, we have been impressed by the number of our own patients who, under methedrine, showed a tendency to dissociation. Shorvon (1953) similarly mentions several cases of prolonged severe hysterical reaction. Masciangelo (1958) also encountered lack of inhibition after amphetamines. In tension states the administration of methedrine is potentially harmful as acute agitation may be precipitated: we have had no such experience with Ritalin.

In comparing the administration of Ritalin with that of the intravenous barbiturates the following points can be made. With Ritalin there is no need to maintain the needle in the patient's vein. Accidental leakage causes no tissue irritation, and where there are technical difficulties Ritalin can be given intramuscularly. There is no danger of inadvertently causing undesirable drowsiness. Disinhibition and emotional release occurs more rarely with intravenous barbiturate than with Ritalin, with which, even if there is no such response, there is at least increased verbal output. The altered state of consciousness

which at times occurs with intravenous barbiturates may be regarded as an advantage or otherwise, depending on the level at which psychotherapy is practised.

Our experience with inhalations of ether, trilene, nitrous oxide and carbon dioxide is limited and thus we cannot make a valid comparison of these with Ritalin. But working independently we felt that patients disliked inhalations and became frightened of them, often refusing further sessions. Ritalin appears much more productive and simpler to use. One of us (R.A.B.) was told by Case 42, who had experience of nitrous oxide with ether, and of Ritalin in separate sessions, that with ether she recalled traumatic experiences more vividly but was unable to talk about them, whereas with Ritalin she did not experience them so acutely but was much more able to discuss and to integrate them. In the Ritalin interview she made use both of fresh material and recollection of that produced in the earlier ether session.

We found no evidence of addiction to Ritalin or over-dependence upon it, even in cases who had quite a large number of repeated Ritalin administrations.

CONCLUSION

We find that Ritalin is a valuable, pleasant and safe aid to psychotherapy, suitable for use with in-patients and out-patients. The reactions are less intense than those of methedrine, giving both operator and patient a sense of smoothness of action, and it has a number of notable advantages over other abreactive agents. Side-effects are minimal, but tachycardia and rise of blood pressure does occur in some cases, and caution should be exercised in patients suffering from hypertension and heart disease.

In our opening remarks we listed four points as the usual indications for a drug-aided interview. We are satisfied that Ritalin increases rapport, puts the patient at his ease, overcomes inhibitions and facilitates the flow of talk. We believe that it assists in the recovery of pre-conscious material, but we have no evidence that it uncovers unconscious memories; it increases the patient's receptiveness to discussion and interpretation, enabling him to integrate and assimilate facts about himself, the full acceptance of which he previously resisted. The patient is thus helped to gain control over the emotional forces within himself, leading to a greater sense of security and self-regard. Finally, while it appears that emotional discharge is not always essential for improvement, the drug is quite capable of inducing an abreaction proper, as defined by Shorvon, Rook and Wilkinson (1950).

SUMMARY

1. A series of 52 patients were treated with parenteral methylphenidate.
2. The literature of abreactive treatment is reviewed.
3. The use of methylphenidate is discussed and contrasted with other abreactive agents.
4. It is concluded that methylphenidate is a useful, safe and pleasant aid to psychotherapy, suitable for use with in-patients and out-patients.

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AN INVESTIGATION OF RELATIONSHIP BETWEEN BIRTH-DURATION AND CHILDHOOD ANXIETIES*

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INTRODUCTION

Historical Background. The possibility of relationship between a person's birth experiences and his later reaction tendencies has long been recognized. Such recognition is expressed in the ancient Chinese saying (translated approximately), "Difficult birth, difficult child".† As early as 1794, Erasmus Darwin (4) wrote that "the association of the disagreeable sensations and actions occasioned by birth" persists throughout life and forms the basis of all later fear reactions.

More than a century later, Freud (10) asserted that birth itself combines that complex of painful feelings, of discharge of impulses, of physical sensations, which has become the prototype for response to danger to life and ever after is repeated as a condition of fear. He attached little importance to one's individual birth experiences in determining the intensity of a person's later anxiety reactions, however. Rather, he contended, the birth trauma operates through genetic assimilation into the human constitution.

Otto Rank (22) placed the emphasis squarely on the individual birth trauma. According to him, the painful experience of birth creates in the individual a reservoir of anxiety, portions of which are released throughout life. Birth is a trauma in that it is a loss of paradisaical bliss, the interruption of the pleasurable "primal state". And it is a subjection to pain and distress, the accompaniments of delivery and independent life. Moreover, the severity of the birth trauma determines in large measure the level of later anxiety and the severity of neurosis.

The problem of whether there is relationship between birth experiences and later anxieties is a difficult one to investigate. Evidence of positive correlation between the degree of adversity of birth experiences and neurotic tendency may be regarded as suggestive. But such evidence cannot be taken as conclusive unless there is reasonable control of the diversity of variables affecting personality once the child has been born. Moreover, conclusive evidence of such relationship would not amount to verification of the relationship as conceived by Rank (22) or by others—e.g. Greenacre (11, 12) and Fodor (8). Psychological or physiological mechanisms underlying or growing out of such relationship would still need thorough objective investigation.

* This paper is derived mainly from the author's doctoral thesis, University of Kentucky (Lexington).

† Contributed by May-Wo Foo Giger. Personal communication.

PERTINENT EMPIRICAL STUDIES

Behaviour. The relatively few empirical studies bearing upon the central question have compared subjects whose birth conditions were unfavourable with subjects whose births were less adverse.

Wile and Davis (30) attempted to investigate possible behavioural consequences of traumata received in instrumental delivery. They compared childhood behaviour problems in 380 spontaneous births with those in 120 forceps deliveries. They state that the data from the instrumental deliveries suggest that the personality is contracted in the presence of a general hyperactivity. These differences are attributed to physical and physiological changes (even though such changes may not be demonstrable) resulting from birth, and not to birth trauma as described by Rank.

Studying 78 children, Despert (5) found a positive relationship between unfavourable birth conditions of various kinds and a variety of psychomotor, behavioural, and verbal manifestations usually regarded as signifying anxiety. Many of the unfavourable conditions among Despert's subjects are pathological, outside normal limits, which seriously reduces the pertinence of the study for the present problem.

Slater (27), studying a large number of twins, found among them 27 pairs of mentally ill twins whose births were known to have been difficult. More than twice as many of the twins who had the more difficult birth had the severer than the less severe mental illness later (37 to 17). The disadvantage of those who had suffered a difficult birth was more marked in the uniovular pairs (9:3) than in the binovular pairs (28:14). This difference is reported for each of the four main clinical groupings: schizophrenic, affective, psychopathic, and organic. Slater asserts that the differences are probably attributable to a minor degree of organic cerebral impairment suffered at birth, which predisposes to mental disorder.

Children delivered by Caesarean section might be expected to show fewer adverse effects from the birth experience than those delivered through the birth canal. Kenworthy (16) mentions comparative studies said to indicate the Caesarean-born infant to be less sensitized than the first-born child delivered normally—to cry less, to be markedly less irritated by handling, etc., than the normally born child. Kenworthy does not identify these studies. Neither do Mowrer and Kluckhohn (19) cite the data on which they base their report that individuals who have been delivered by Caesarean section differ, as adults, in no discernible way from persons born in the normal way.

Premature birth has been considered as being more traumatic to the organism than normal birth; the foetus has relatively poor physical preparation for his "ejection" from the womb, premature births tend to be cataclysmic, unduly prolonged or precipitate, and carry with them still other physical disadvantages. One should expect evidence of personality disturbance among the prematurely born if the foregoing assumption is correct.

Shirley (26) made a long-term behavioural study of 99 children whose births were premature. She found in her subjects a behaviour syndrome characterized by auditory and visual sensitivity or interest, motor difficulties, hyperactivity or sluggishness, difficulties in sphincter control, and problems in emotional and social adjustment. Hirschl *et al.* (13) and Drillen (6, 7) observed among their prematurely born children a similar hyper-emotional, anxious picture along with behaviour disorder and a comparatively high incidence of upper respiratory infections.

Duration of birth is a dimension which offers another approach to the problem of birth-related psychological tendencies. Pearson (20) utilized this approach in perhaps the first published empirical investigation of the question. He attempted to relate various symptoms of neurosis and anxiety to birth-duration by intensively studying the lives of 72 children under seven years of age who presented behaviour problems. He chose problem children because he believed the relationship between cause and effect might be accentuated when behavioural traits were exaggerated. Children whose birth-time was less than six hours were compared with those whose birth required more than 14 hours. His results were essentially opposite to what Rank's claims would lead one to expect. He points out, however, some features that may have obscured the relationship in question: the child whose birth was short was more often the youngest and had very indulgent parents, while the child whose birth-time was long was the eldest, the oldest child of the sex, or the only child and tended to be the child of extremely over-solicitous parents or to have had a babying mother or an impatient or indulgent father.

Foetal Sensori-motor Capacities. Ability of the foetal nervous system to receive and retain impressions, crucial in the present problem, has received considerable study. Had neurological and foetal-behaviour studies pointed to the impossibility of reception and retention of experiences, we should not have undertaken the present original experiment. The relevant studies imply at least the possibility that sensory impressions at birth may leave some kind of central record—at a spinal, a thalamic, or a cortical level, or in some combination of these. Not only is the grey substance in the foetus of three months arranged in what is essentially the permanent form (Hooker, 6; Arey, 1), but myelinization (which is not an essential corollary of functioning) is also sufficiently advanced to permit a good deal of well-organized neural activity (Langworthy, 18; Windle, 31). And there is the possibility of some kind of cortical participation, possibly as a passive repository of foetal experiences (Preyer, 21; Kappers, 15; Windle, 31). Moreover, there are the studies reporting the considerable activity and responsiveness of the foetus *in utero* or when removed from the uterus (Kenworthy, 16; Forbes and Forbes, 9). Most impressive among these are the reports of the establishment of rather enduring conditioned responses in foetuses several weeks before term (Ray, 24; Sontag and Wallace, 28; Spelt, 29). In short, examination of authoritative studies yielded no evidence signifying the absolute impossibility of lasting neural impressions established at birth or before, and considerable evidence suggesting the possibility of such impressions.

THE EXPERIMENT

Hypothesis. Duration would seem to be one varying condition in the process of birth lending itself to empirical investigation as an aetiological factor in the formation of later anxiety symptoms and other reaction patterns. We should expect the attendant manifold discomforts and profound physiological changes of the foetus to vary positively with the duration of birth. Thus the hypothesis is that an individual whose birth was protracted will show differences in behaviour, including various manifestations of anxiety, from an otherwise similar individual whose birth was short. Moreover, such differences should be detectable by the use of standard psychological techniques.

Subjects. It was possible to select pairs of subjects who were similar in many respects but very different as to the duration of birth (as determined by

the attending physician from history and his observations). The subjects came from a population of seemingly unusual geographical, cultural, and socio-economic homogeneity. Children between the inclusive ages of 7 and 12 years were chosen because of availability and for obvious theoretical reasons. Subjects constituting the "experimental" (long birth-time) and "control" (short birth-time) groups were matched and the groups equated satisfactorily (t -ratios) as to sibling position, age, school grade, and the mother's age at the time of the subject's birth. T -ratios were significant for the prevalence of boys over girls in the experimental group and for the prevalence of apparently better financial conditions among this long-time group. Any of the following conditions disqualified a child as a subject: instrumental delivery; delivery under deep anaesthesia; premature birth (less than term); Caesarean section; birth complicated by eclampsia or puerperal fever; known delinquency, mental deficiency or physical affliction in the child; mental illness in the parents; and broken homes.

Procedure. The preliminary phase of the study was done on a group of 23 children whose mean birth-time was 17.50 hours and a like number whose birth-time averaged 3.08 hours. This phase consisted of an interview and preliminary testing of the child and an interview with each child's mother. We asked the mother to state which of 29 rather common fears she believed she had clearly observed in the child in question, whether the child was considered a nervous child, whether she considered herself more nervous than most persons are, and to answer other pertinent questions. A check-list of sixteen behavioural items—12 clinically significant of anxiety, and four representing healthy, non-fearful behaviour—was used to characterize the subjects according to the combined judgment of the examiner and his assistant.

The second phase of the study consisted of Rorschach examination of each subject. We gave the test to 23 pairs of subjects drawn from the same population and matched in the same way as previously described. Mean birth-duration for one group was 17.76 hours, while that for the other was 2.98 hours.

THE RESULTS

The mothers of the children whose births were short reported an average of 1.54 (S.D. 1.55) observed fears per child, while mothers of the children whose birth-time was prolonged reported an average of 8.50 (S.D. 3.86) fears each. Enumeration of opportunities for contamination of these reports would be superfluous.

Mothers reported that 17.76 per cent. of the children in the shorter birth-time group were considered nervous children, as against 62.50 per cent. of the children whose birth-time was long (t -ratio 3.60). Of the mothers of the control children (short birth-time), 20.83 per cent. considered themselves more nervous than most persons are, while the proportion is 33.33 per cent. for the mothers of children whose birth was long (t -ratio .96).

Differences between the interview behaviour of the two groups at the first meeting were noticeable. Significant differences on items in the check-list are presented in Table I.

Differences between the Rorschach records of the groups were far more numerous than might have occurred on the basis of chance alone—half the 25 Rorschach dimensions considered (estimated from the tables of Sakoda *et al.*, 25).

TABLE I
Summary of Behaviour

Behaviour	Frequencies	
	Short Birth-time Group	Long Birth-time Group
Verbalized reluctance to go to the testing situation	0	10
Questions such as "May I go now?" and "Are you finished with me?"	1	8
Absence of questions or spontaneous conversation between parts of the examination	9	16
Indecision on test items	7	13
Hanging on to mother	0	7
Lively interest in testing	14	7
Continued without request to chat with examiner after completion of testing	13	5
Came to car spontaneously before formal interview ..	8	1

The possibility that brain damage or mental defect in our prolonged birth subjects might account for our Rorschach differences is one of the first we considered. Several of the Rorschach features involved in those syndromes yielded insignificant differences and do not appear in Table II. Actually, the Rorschach patterns suggest slightly better intellectual capacity among the experimental subjects than among the controls. The direction of the differences in certain Rorschach areas is as important as the absolute quantities. Our long

TABLE II
Summary of Significant Differences between Means of Rorschach Scores

		Birth-time Group		Difference	Level of Confidence Per cent.
Rorschach Component		Long (n 23) M	Short (n 23) M		
F percentage ..	..	46.59	68.02	19.43	1
A percentage ..	..	35.13	58.02	20.89	1
P	..	3.05	3.83	.78	4
M	..	.83	.30	.53	4
C	..	1.48	.83	.65	4
Y, R using ..	..	5.26	2.22	3.04	1
V, R using ..	..	2.04	.44	1.60	1
Cloud, Smoke ..	..	1.36	.30	1.05	1
Landscape ..	..	2.09	1.00	1.09	4
Geography ..	..	.52	.22	.30	4

birth-time subjects earned higher scores in these intelligence-reflecting areas than did the children of short birth duration: M, W%, Z-sum, associational range. The response-total is practically the same for groups—23.17 and 24.65. Moreover, our subjects whose births were on the average, almost a school grade ahead of the children whose births were short. Typical diffuse cerebral impairment and mental deficiency are not suggested as features responsible for the differences obtained.

The children whose births were long showed significantly more of the commonly accepted Rorschach signs of anxiety (e.g. vague responses and sensitivity to light as a response-determinant) than did the controls. Brief examination of expert opinion on these criteria seems worthwhile at this point. Rapaport (23) points out that anxiety can underlie all vague responses, however

large or small the area. He states that anxiety can prevent penetration of the indistinct perceptual mass even though distinct features that might serve as suitable starting points are present and noticed. Rapaport's view is widely held. We are inclined to ascribe mainly to anxiety the differences we obtained in the categories of Cloud, Smoke, Landscape, Geography, etc. (see Table II).

The preceding content categories obviously offer greater opportunity to use shading and vista (Y and V) than do many other categories. But any such relationship need not greatly reduce the significance of the conspicuous differences we found in the general area of the light-determined response. Beck (2) considers both Y and V as projecting experiences of oppressive feeling quality. The vista response occurring in a neurotic setting is said to signify the Adlerian "inferiority complex". Bochner and Halpern (2) and Rapaport (23) use such terms as "basic instability", "sensitivity", and "anxiety" in describing the significance of responsiveness to light and shading in the Rorschach figures.

Tending to complement the suggested picture of comparatively high anxiety among the experimental children are the accepted Rorschach signs of relatively labile, or at least less mature, affective response: these children gave significantly more pure-C and less FC than did the children whose births were short. It will suffice here to mention Beck's (2) statement as to the significance of the formless colour response. He regards it as the Rorschach test's equivalent of the undiluted feeling experience, an infantile response. It is not abnormal in the very young child; but occurring in the older child and in the adolescent, it leads to expectation of tantrums or other outbursts. Of the FC percentage, Klopfer and Kelley (17) state that one of the best-proved and validated assumptions about the Rorschach method is that the proportion of form-colour responses reflects the degree of emotional adjustment to outer reality.

It is noteworthy, too, that our composite Rorschach configurations for the two groups suggest less attention to the commonplace, the practical and to common viewpoints among the long birth-time children than among the children of short birth-time.

It will be noticed that the frequency of such Rorschach content as Landscape, Cloud, Smoke, Geography is higher for our groups than it is for existing normative groups. Such responses are vague, and they often utilize shading and vista. Since they are regarded as generally significant of anxiety of one kind or another, the obtained frequency of responses of these types among our subjects could imply that our children were more anxious or anxiety-prone than were most of the children in current normative groups. We assume, however, that the frequency of the responses in question may be influenced by the proximity of such content in the natural, rural environment. It follows that vague, shading, and vista responses may be less significant of anxiety among our rural children than among urban children.

As had been expected, some of our subjects of long birth-duration showed no more Rorschach signs of anxiety than did the short birth-time subjects with whom they were matched. In fact, the child whose Rorschach record suggested the highest level of anxiety was a 10-year-old boy whose birth-time was short.

The differences between our two groups were greater and more numerous than we had expected, and we have very little ready explanation for such contrast. A few observations, though, seem worthy of presentation here.

We believe we observed certain features of our subjects' social environment that might tend to nourish neurotic tendency more than is generally

the case in certain other places. One of these was that the mothers, noticeably kind to their children, often seemed actually indulgent with a child they considered to be nervous. Nervousness generally seemed to be accepted as simply one characteristic of the child's natural disposition. The parents' prevailing somewhat low educational level and their rural, primary-group setting may have contributed to the comparatively high degree of that kind of tolerance. Also noteworthy is the fact that no mothers held regular jobs away from home, while fathers spent a relatively large amount of time in or near the home. Thus parent-child relationships may have been such as to contribute to neurotic or introversive patterns in the child. Interestingly, childhood delinquency was essentially non-existent in the communities.

We cannot answer the important question of whether the mother's experiences in bearing a child influence to an appreciable degree her attitude towards and treatment of that child. Should the answer be affirmative, then the relevance of our data (and similar data) to the question at hand is reduced. The child's anxieties might be related less to his own birth experiences than to his mother's experiences in bearing him.

Unfortunately, we had not available a sufficient number of suitable subjects to ensure a truly representative sample. Moreover, a multitude of variables, known and unknown, were beyond control. Thus, this study is exploratory, and the results are suggestive, not conclusive. Exploratory studies with suggestive results collectively may provide the basis for reasonable inferences. Viewed in this way, our findings and the others reviewed herein may be of value.

SUMMARY

Comparison of 23 children whose birth-duration was prolonged ("experimental group") with 23 children whose birth-time was short ("control group") yielded these statistically significant differences:

1. More experimental than control-group children were described by the mothers as nervous children.
2. Experimental-group children had shown more fears than those in the short birth-time group, according to the mothers' reported observations.
3. In the examination situation, experimental-group children showed the greater proportion of such negative behaviour as verbalized reluctance, refusal to co-operate, silence, etc.
4. Generally accepted Rorschach test signs of anxiety were more prevalent among the experimental than among the control subjects. Rorschach evidence of immaturity or lability of emotional response likewise was more prevalent among the children whose birth was prolonged. Control subjects showed more Rorschach evidence of conformity of general thinking and greater interest in the commonplace and practical than did the experimental subjects. Basis was lacking for inferring impaired intelligence or typical brain damage as characteristics of the experimental group.

The results are presented as suggestive, not conclusive.

Relevant literature is briefly reviewed.

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THE REES-EYSENCK BODY INDEX AND SHELDON'S SOMATOTYPE SYSTEM

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IN a recent paper, Parnell (1957) has criticized the Rees-Eysenck Body Index (Rees and Eysenck, 1945) on a number of grounds. He also showed that high values on the index corresponded to high values of Sheldon's ectomorphy component, while low values on the index corresponded to low values of the ectomorphy component, and high values of the endomorphy and more particularly the mesomorphy components. In this paper a brief attempt will be made to answer Parnell's criticisms and indicate why the Rees-Eysenck Body Index appears to be preferable to the Sheldon system.

Parnell starts off by stating that "statistical treatment by itself, however sophisticated, is no substitute for the best or right choice of measurements". He goes on to say that "in any morphological classification aimed at achieving high correlation with behaviour, it would seem reasonable at least to separate fat and its function from muscle and motive power". He illustrates his point by presenting photographs of two men of equal score in the B.I., who differ profoundly in the sense that one is fat and the other one muscular. He concludes "that measurements of fat and muscle should be added to the correlation matrices from which factors are derived in future analyses".

Parnell by implication assumes that the variables included in Sheldon's system constitute "the best or right choice of measurements". This view is not shared by competent and sophisticated reviewers of the field. Thus, in a recent paper, Humphreys (1957) discussed Sheldon's typology and introduced his paper with the following words: "The writer became interested in Sheldon's physical and temperamental types because they have been so widely, and frequently so favourably, discussed in recent years. Relatively little investigation was needed in order to discover that the favourable discussions had little foundation in fact for the attitude expressed and that the use of Sheldon's types in further research should be discouraged". Most of the criticisms made by Humphreys, as well as those by Ekman (1951) and Eysenck (1953), are statistical in nature. Sheldon requires three variables for his description of body build, as well as for his description of temperamental types. In both spheres these components show quite high negative correlations with each other, and both Humphreys and Ekman, using different methods, have shown conclusively that the data can be described just as efficiently with two uncorrelated variables as with three correlated ones. The obvious statistical difficulties of working with three negatively correlated variables when two orthogonal ones would do equally well, would seem to suffice in ruling Sheldon's system out of court. As Humphreys says, "Research workers, if they want to make use of Sheldon's types, are advised to discard one physical type and the corresponding temperament type. This would result in a saving of measurement time and statistical analysis of data. If multiple regression analysis is planned, however, the recommended procedure becomes compulsory. Beta-weights can be reliably

determined on only two of three mutually dependent variables. Even if the research worker in this field discards one of the three types, he can still have no confidence in the meaningfulness of the two retained."

It is not only the choice of measurements which is impugned by recent criticism. Sheldon claims to have established correlations of the order of .8 between body build and temperament. However, as has often been pointed out, the data on which these correlations were based were contaminated by the fact that both sets of ratings were made by the same judge. Later work, not involving such contamination, has usually resulted in correlations in the neighbourhood of .3 at best (Eysenck, 1953). As Humphreys says, "Sheldon's claims for having established relationships between physique and temperament, are thus 'thrown out of court' for lack of evidence". Parnell thus seems to be on dangerous ground in assuming the adequacy of Sheldon's typology, and in view of the fact that all these criticisms had already appeared in print when he wrote his paper, one might have expected him to back his choice of Sheldon's system in some way by a rebuttal of the criticisms made of it. (Humphrey's paper appeared only in 1957, but the arguments quoted from it had been made earlier by Ekman (1951) and Eysenck (1953).)

We must now return to the Rees-Eysenck Body Index and consider Parnell's criticisms of it. In their work Rees and Eysenck were particularly concerned with the more permanent variables defining physical habitus, i.e. with skeletal measurements. Taking a wide variety of measures of a standard anthropometric kind on several populations, and intercorrelating and factor analysing these measures, they discovered, as had several other authors previously, that two factors were adequate within relatively narrow limits to account for all the communal variance. (A review of the earlier work has been given by Eysenck (1953). It should be noted that the application of factor analysis to physical measurements was not initiated by Burt, as Parnell claims, but by Spearman (1927), some fifteen years earlier.)

The two factors which appear to describe physical habitus with such remarkable accuracy, can be manipulated statistically in various ways. We might think of the body as a rectangle, having a given height or length (L) and a given width or breadth (B). Total height appears to be a good measure of L, and transverse chest diameter appears to be a good measure of B. If we multiply $B \times L$ we have a measure of the total area of the rectangle, or, in the

case of the body, total body size. If we divide $\frac{L}{B}$ we have a good measure of the

proportions of the rectangle, i.e., whether it, or the body which it represents, is lean and narrow, or broad and squat. With some suitable statistical refinements, the Rees-Eysenck Index attempts to fulfil the latter of these requirements and gives what we consider to be a reasonable and adequate description of the relative linearity of the person's skeletal development. We have also dealt with total body size (Rees and Eysenck, 1945) and have found quite sizeable relationships between body size and temperament; for the purpose of this paper, however, these developments would appear to be irrelevant.

Parnell criticizes our index for not incorporating measures of the relative preponderance of fat and muscle. This does not appear to be a reasonable criticism. Any measure in science is useful to the extent that it isolates one important variable. Any attempt to complicate it by adding other variables makes the measure useless. Parnell's Figure 1 (p. 211) suggests that the mesomorph/endomorph (muscle/fat) dimension is orthogonal to the Rees-

Eysenck Index. It is difficult to see how the two can be combined, or what possible meaning such a combined index could have. Our index sets out in the most economical and reliable manner possible, to give a numerical description of a relatively permanent body type defined by the skeleton; it does not claim to measure the fat/muscle ratio, just as little as it attempts to measure the subject's intelligence. It is difficult to see, therefore, the relevance of Parnell's illustrative example showing that people having the same body index may differ in respect to their fat/muscle component. This hardly requires demonstration as it follows from the method of derivation of the index, just as it follows that of people having the same body index, some may be bright and some may be dull.

Parnell might revise his criticism to read something like this: The Rees-Eysenck Body Index leaves out of account an important variable in body build, which has significant correlations with temperament. Accordingly the muscle/fat ratio is suggested as an *additional index* which may be of greater interest and importance from the point of view of its psychological correlates than is the Rees-Eysenck Index. An adequate description of a person's physical habitus at any given time should include both these indices as well as, perhaps, an index of general body size such as that advocated by Rees and Eysenck. Such a reformulation lends itself to both a theoretical and an empirical examination and we will accordingly turn next to a brief discussion of these points.

There can, of course, be no objection to the proposal that a special index should be established dealing with the respective predominance in the body of fat and muscle; Lindegard (1953, 1956) has brought forward many considerations in favour of such a proposal. An index of this kind, however, would most certainly be much more changeable than an index of skeletal body build such as the Rees-Eysenck Index. Most psychiatrists will be familiar with the young athletic type who puts on fat in middle age; there seems to be little doubt that such a person would change his position on the continuum defined by any such new index proposed to a considerable extent. Equally, we have the findings of the Minnesota Starvation Study which showed beyond doubt that gross changes in respect of the non-skeletal components of body build can be produced by environmental influences.

Granted this weakness, the question of the usefulness of the fat/muscle index in predicting personality variables becomes a purely empirical one. Does such a new index give us correlations with temperamental variables which are different from, or higher than, those obtained by means of the Rees-Eysenck Index? In answering this question tentatively at least we shall make use of a recent paper by Davidson, McInnes and Parnell (1957) dealing with personality traits of 50 boys and 50 girls, all aged seven. Before looking at the results of this study, it may be useful to recapitulate the relationships between personality and the Rees-Eysenck Index as demonstrated and postulated in a series of studies (for a brief review of some of this work, see Eysenck, 1953). Put very briefly, we have found that there is a correlation of about $\cdot 3$ between leptomorphic body build and introverted personality traits. Similarly, we have found that there is a correlation of the same order between leptomorphic body build and neurotic personality traits. These relationships have been observed by others also, and may be regarded as relatively well established. It should be noted, of course, that the terms "introversion" and "neuroticism" are not necessarily used in the psychiatric sense but have the operational meaning given to them by a series of experimental studies originating with *Dimensions of Personality* (Eysenck, 1947) and culminating recently in the theory developed in *The*

Dynamics of Anxiety and Hysteria (Eysenck, 1957). According to the data there presented, hysterics and psychopaths are people who score high on neuroticism and extraversion, while dysthymics (anxiety states, reactive depressions, obsessionals) are people who score high on neuroticism and introversion.

We have already indicated that Parnell's data suggest that the ectomorphic component of Sheldon corresponds rather closely to our concept of leptomorph body build. Accordingly, we would expect ectomorphs to show introverted and neurotic personality traits as compared with mesomorphs and endomorphs. That this is so is strongly suggested by the characterization Sheldon gives of cerebrotonics. The following traits he mentions are typically introverted: "love of privacy, socio-phobia, inhibited social address, need of solitude when troubled, introversion". To this list might be added the item "resistance to alcohol, and to other depressant drugs"; evidence on this point is given in a series of papers recently published in this journal (summarized in Eysenck, 1957) and in the work of Shagass (1955, 1956) and his collaborators on the sedation threshold. Items characteristic of neuroticism are the following: "physiological over-response, mental over-intensity, apprehensiveness, hypersensitivity to pain, chronic fatigue". Conversely, items characteristic of extraversion and normality (as opposed to neuroticism) are apparent in Sheldon's description of the viscerotonic and somatotonic types.

When we now turn to the empirical study mentioned above, we find the following results. On scholastic attainment tests of reading ability, ectomorphs were distinctly superior to the other groups, correlations of $\cdot 3$ and $\cdot 4$ being observed. This result agrees well with the finding reported by Himmelweit (1945) who found extraverts (hysterics) to have a poor vocabulary relative to their intelligence, while introverts (dysthymics) were found to have a good vocabulary. Our prediction that ectomorphs would show introverted personality traits is thus supported on this point.

The next finding in this study relates to the Rorschach test. Here ectomorphs were found to have relatively high movement responses, while the endomorphs are relatively higher on form and colour. (The data are inadequately presented for the mesomorphs, so that little can be said about them. The authors find a significant correlation between mesomorphy and total number of responses given, but apparently did not partial out this factor from their correlations between body build and Rorschach scores.) As far as they go these results are in line with the finding by Eysenck (1956) that movement responses were correlated with introversion, while form and colour responses were correlated with extraversion. In view of the unsatisfactory statistical treatment given to their data by Davidson *et al.*, even this result however must be regarded as quite tentative.

When we turn to psychiatric assessments we find that "boys and girls with high standards tend to be more slender in build than average". This finding of a correlation between ectomorphy and high social standards is well in line with Eysenck's (1957) demonstration of a relationship between introversion and tender-mindedness on the one hand, and extraversion and criminal/psychopathic behaviour on the other. It is of interest in this connection that several recent studies have shown a distinct relationship between delinquent behaviour and mesomorphic body build.

The psychiatric assessments also demonstrated a relationship between ectomorph body build and anxiety and emotional unrest. This supports our finding of high neuroticism being associated with leptomorph body build. Nightmares and night terrors, too, were more frequent among ectomorphs.

There is another method of testing Parnell's hypothesis. We can derive ratio indices of physique by dividing the mesomorph component into the ectomorph component, the endomorph component into the ectomorph component, and the mesomorph component into the endomorph component. According to Parnell's hypothesis the last of these ratios should give particularly high correlations with external criteria of personality; according to our view it should be the former two ratios which would produce this result. Smith (1957) has reported such a study on 181 students tested on four of the MMPI scales. The mean correlation of the endomorph-mesomorph ratio with these four scales was .19; that of the other two ratios was .33 and .48. With one exception, *all* the correlations which had been expected to be significant on the basis of our hypothesis were significant at the 1 per cent. level; with one exception, *none* of the correlations predicted to be significant on Parnell's hypothesis were so, even at the 5 per cent. level. The actual correlations show a quite marked tendency for introverts to be leptomorph in body build. There was no neuroticism scale included, but the hypomania scale, which has often been found to correlate negatively with neuroticism, was found to correlate negatively with leptomorph body build also.

It will be clear that the findings of these studies are in good agreement with the hypothesis linking leptomorph body build with introversion and neuroticism. The writer has failed to find any evidence in these studies of a relationship between temperament and body build which required the postulation of an additional factor in the description of body build, and we may conclude that Parnell and his associates have failed to make out an empirical case for the usefulness of their suggested muscle/fat component. Until such evidence is forthcoming, we must remain sceptical of the value of this suggestion. From the available evidence it is difficult to come to any conclusion other than that the Rees-Eysenck Index, as compared with Sheldon's system, is not only superior, statistically and empirically, in the description of body build, but that it also fits into a much simpler description of temperament without any loss of empirical information.

One further argument is open to Parnell. He might argue that according to Sheldon the three components of body build are derived from the three embryological layers, and that accordingly any reduction to two components would do violence to the physiological facts. The answer to this point is relatively simple. The embryological hypothesis which was originally put forward in Italy, Austria and Germany around the turn of the century is superficially feasible but is supported by no empirical verification whatsoever. Until some attempt is made to provide such verification we can only regard it as an interesting speculation the value of which it is impossible to assess.

SUMMARY AND CONCLUSIONS

The objections of Parnell to the Rees-Eysenck Index of body build have been examined and found to be based on erroneous premises. A critique has been offered of Sheldon's system of somatotyping which was stated by Parnell to be superior to the Rees-Eysenck Index. Finally, a comparison was made between the two systems in terms of their ability to account for certain empirical findings reported by Parnell and his associates with respect to the relationship between body build and temperament. It was concluded that Sheldon's system was unnecessarily complicated, statistically inadequate, and theoretically not well founded. It was demonstrated that the Rees-Eysenck Index could embody the established empirical findings without apparent loss of information, despite its simplicity.

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TRIFLUOPERAZINE (STELAZINE) IN PSYCHONEUROSES A CLINICAL ASSESSMENT

By

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INTRODUCTION

TRIFLUOPERAZINE (Stelazine) is a phenothiazine derivative and is 2-trifluoromethyl-10-(3' 1"-methyl piperaziny-4"-propyl) phenothiazine dihydrochloride. It is related to prochlorperazine, and in fact differs only in having a trifluoromethyl group in place of the latter's chlorine atom in position 2 of the nucleus. However, in laboratory studies, tests based on the inhibition of conditioned responses have indicated that this compound was 5 times as effective as prochlorperazine and 10 times as potent as chlorpromazine on a weight for weight basis.

Trifluoperazine has been used both in this country and America for the treatment of psychotic hospitalized patients and it has been found that schizophrenic patients respond well to the drug (Madgwick *et al.*, 1957). Even with the relatively high doses required in these conditions no cases of jaundice or haematological changes have been observed.

Little work has so far been carried out with Trifluoperazine in the treatment of psychoneurotic patients, and at the moment there are no reports available for comparison. Because of its potency and lack of serious side-effects we decided to undertake a clinical evaluation of the drug.

SELECTION OF CASES

All the patients assembled for this trial were attending the out-patient Psychiatric Clinic, and the initial criterion for selection was that they showed tension, irrespective of their specific symptoms or diagnostic label. Duration of symptoms varied from less than 12 months to more than 5 years, and all patients had undergone previous psychiatric treatment, sometimes in hospital, ranging from drug therapy with sedatives or tranquillizers to psychiatric physical treatments.

Selection of those patients included in the investigation was prompted partly by the lack of effective treatment for them, and partly to elucidate whether our objective methods of assessment could distinguish what class of patient, if any, was likely to respond to this new drug.

In all, 44 patients were selected, of whom 29 completed the trial, while the remaining 15 defaulted because they did not complete the full course with either active or control tablets.

METHOD AND RATINGS

A "double blind" procedure was adopted, the drug being administered orally. Both active and control tablets were identical in appearance and neither patient nor doctor knew which the patient was taking. The key was kept by the pharmacist till the conclusion of the trial.

The dosage was maintained at 2 mg. thrice daily throughout the investigation. Patients completing the trial were allotted initially at random to active or control tablets, and had consecutive four-week periods on each. All other drugs were stopped.

Every effort was made to avoid influencing patients by suggestion. They were told that their case had been under review, that it had been decided to try them on another sort of pill, and that it would be necessary to go into their symptoms in a little more detail in order to refresh the memory of the doctor concerned. No form of psychotherapy was employed at visits during the course of the trial and interviews were directed only towards eliciting necessary information and maintaining rapport.

Assessments were made on each patient initially and at two subsequent intervals of four weeks after taking active and control tablets or *vice versa*.

Ratings were made on the Wittenborne Scale (Sections dealing with anxiety and phobic symptoms) and interviews were constructed round this. A pilot trial with all three doctors present at interviews with patients indicated satisfactory correlation in ratings allotted independently on this scale, and during the trial ratings on each patient were made only by the doctor directly concerned. Once made, they were filed and were not available for reference at subsequent interviews.

In addition, clinical ratings by the doctor were made on a five-point scale after each four-week period. "Much improved" (+2) signified that symptoms had remitted and no longer troubled the patient. "Improved" (+1) indicated amelioration of symptoms but not complete relief. "Worse" (-1) meant an exacerbation of symptoms, though not to an insupportable extent, while "Much Worse" (-2) meant that the patient was severely distressed by symptoms which proved incapacitating. "No Change" in symptomatology was scored as 0. Subjective assessments were also invited from patients themselves, and were scored in a similar way. Wherever possible, ratings on this scale were also obtained from relatives either by interview or by letter.

RESULTS

In trials of this kind a clear-cut assessment of the results is necessary if a simple statistical test of their validity is to be made. Patients were, therefore, classed only as "Improved" or "Not Improved". This was done from both the clinical assessment and the Wittenborne Rating. In order to make direct comparison possible the Wittenborne Rating was converted to an "Improvement Index". This was done by taking the difference between the Ratings before and after treatment and expressing it as a percentage of the original Rating. A reduction in the Rating of 45 per cent. or more was classed as "Improved".

Twenty-nine patients completed the trial. There was a close correlation between the doctor's, patient's, relative's assessment, and the Wittenborne Rating in that 18 patients were classed as improved by all methods after active treatment. Two additional patients were classed as "Improved" clinically but did not show an Improvement Index of 45 per cent. on the Wittenborne Rating and two patients who had an Improvement Index of 46 per cent. and 47 per

cent. respectively were not classed as "Improved" clinically. It is felt that both criteria of improvement should be satisfied and, accordingly, the results then show that 18 patients were "Improved" after Stelazine treatment and 11 patients were "Not Improved".

On placebo treatment there were 6 patients classed as "Improved" and 23 as "Not Improved". Here there was complete agreement between the clinical assessments and the Wittenborne Rating.

The results are summarized in Table I and from this table it can be shown that the difference is significant at the 1 per cent. level ($\chi^2=8.6$, $p<0.01$).

TABLE I
Results in 29 Cases Completing Trial

							Improved	Not Improved
Stelazine	..	..	..	..	..	..	18	11
Placebo	..	..	..	..	..	..	6	23

$$\chi^2_c=8.6. \quad p<0.01.$$

TABLE II
Clinical Profile of Cases Improved

Case No.	Sex	Age	*Duration of Symptoms	Clinical Diagnosis	Personality	†Previous Therapy	Main Symptoms
1	M	33	M	Obsessional state	Obsessional	E.P.D.	Phobias
2	F	45	L	Obsessional state	Obsessional	E.P.D.	Nausea. Palpatations
3	M	40	L	Obsessional state	Obsessional	P.D.	Phobias
4	F	54	L	Obsessional state	Obsessional	E.P.D.	Obsessions and compulsions
10	F	38	M	Anxiety state	Hysterical	E.P.D.	Panic attacks
13	M	42	M	Anxiety state	Over-anxious	E.P.D.	Panic attacks
15	F	44	S	Obsessional state	Obsessional	E.P.D.	Headaches. Anorexia
16	M	31	M	Anxiety state	Inadequate	E.P.D.	Panic attacks
18	F	34	L	Obsessional state	Obsessional	P.D.	Irritability
19	F	57	S	Anxiety state and reactive depression	Obsessional	P.D.	Head pains
20	M	30	S	Obsessional state	Obsessional	P.D.	Somatic pains
25	F	24	M	Anxiety state	Inadequate	D.	Panic attacks
28	F	51	M	Obsessional state	Obsessional	E.D.	Phobias
29	F	35	L	Obsessional state	Obsessional	D.	Phobias
32	F	40	L	Anxiety state	Hysterical	P.D.	Tension
33	F	36	L	Obsessional state	Obsessional	P.D.	Phobias
34	F	29	M	Obsessional state	Over-anxious	D.	Phobias
43	F	26	S	Anxiety state	Over-anxious	P.D.	Panic attacks

† E = E.C.T.
P = Psychotherapy
D = Drugs

* S = Less than 12 months.
M = Intermediate.
L = More than 5 years

DISCUSSION

These results suggest that Trifluoperazine is a valuable addition to the range of drugs available for the treatment of psychoneurotic symptoms, especially those phobic symptoms often associated with a good deal of tension which are seen in obsessional personalities. This type of case is notoriously difficult to treat. Claims made for the beneficial effects of chlorpromazine in such cases have not been substantiated (Garmany, *et al.*, 1954) and in our opinion this new drug is to be preferred.

Case No. 20

A single man of 30, of obsessional personality, working as a salesman. Numerous trivial somatic symptoms, worried and apprehensive to the extent of being unable to concentrate on work or to make decisions. Had previously had relaxation exercises with some improvement but relapsed. Had Largactil, Equanil and supportive psychotherapy without further relief. On Stelazine he was much improved, and no longer worried about his somatic complaints. He now made the decision to change his job with considerable financial advancement, but on the control tablets he became very apprehensive about what he had done, and had an acute panic attack for which he went to a chemist for extra sedation. On Stelazine he again improved and has remained well for 6 months.

Case No. 33

A married woman of 36 with severe phobic attacks and obsessional doubtings since adolescence. She had been in hospital, had received barbiturate sedation and intensive psychotherapy, but after initial improvement had relapsed. On Stelazine she improved, relapsed to her former state on the placebo, but improved again on Stelazine. Now, 6 months later, she is freer than ever before of her phobic attacks, is able to walk in the street alone, and is no longer preoccupied with doubts which beset her previously.

Trifluoperazine is also well worth consideration in Anxiety States, especially where panic attacks are prominent.

Case No. 13

A 42-year old Clerk who had attended the psychiatric out-patients department for 2 years with symptoms of many years' duration. He originally presented with tension, headaches and hypochondriasis. His pre-morbid personality was over-anxious and obsessional. Despite various psychiatric treatments there had been little or no change in the clinical picture. When he began Stelazine he was displaying tension, panic attacks and irritability to a marked extent. Three days after starting the drug, he began to improve and this was maintained until he changed to placebo when he experienced a resurgence of all his symptoms. Finally on resuming Stelazine he improved again and is maintaining this on 2 mg. t.d.s. 6 months later.

Case No. 19

A married woman of 57 complaining of head pains and fears of going mad. Rigid personality, quiet and hard-working. Two of her children suffered nervous breakdowns. Previous treatment included Sparine, Amytal, Drinamyl and supportive psychotherapy, but with little change in symptoms. On Stelazine she felt much better, "Like her old self", and her head pains disappeared. After 2 weeks on the placebo she had relapsed "right back to where she started" and had to seek help from her family doctor. Back on the drug she improved again, has remained well since.

Cases with a predominantly depressive element did not respond to the drug in the dosage employed, and this failure to influence the associated tension has previously been noted with other phenothiazine derivatives.

Two points about this trial require special emphasis. Firstly, an attempt has been made to achieve a more critical assessment of results by combining ratings by doctor, patient and relative, and checking these against the formalized and validated procedure of the Wittenborg Rating Scale. Only cases showing improvement by all these standards were accepted as responding to the drug. The occurrence of a placebo response in some patients confirms the necessity for a double-blind procedure in drug trials of this type. Any safeguard against subjective bias on the part of the observer is important in such trials, and the methods adopted here go some way towards meeting this requirement on a practical basis with out-patients.

In the second place it should be noted that the dosage employed was very small compared with that used on psychotic patients (Rudy *et al.*, 1958). There were no complaints of drowsiness or lethargy among our patients, and relaxation and amelioration of symptoms were achieved without sedation. Paradoxically, eight patients with panic attacks complained of an increase in tension and apprehension while on the drug and stopped taking it for this reason. Subsequently, after the trial, the drug was restarted with the addition of Amytal gr. $\frac{3}{4}$ t.d.s. and this combination has proved effective where Amytal alone was not.

An important practical outcome of this method of assessment has been that we are better able to select the patients likely to respond well to this drug, rather than finding ourselves prescribing it indiscriminately as has too often been the case with tranquillizers, to the detriment of the patient and the taxpayer. Some of the patients have now been on trifluoperazine for 6 months

or more, and the clinical results in these cases seem to have substantiated our predictions.

SUMMARY

A new phenothiazine derivative, trifluoperazine (Stelazine), was assessed for its value in treating psychoneuroses, by means of a double-blind trial on out-patients. Patients were originally selected from those displaying tension, irrespective of diagnosis. Ratings made on a clinical basis were correlated with those made on the Wittenborne Scale. The criterion of improvement was limited to patients showing a positive response on both rating scales, and by this standard 18 cases out of 29 completing the trial were improved. Results suggest that trifluoperazine is a useful addition to the drug therapy of psychoneuroses, especially in cases where phobic symptoms are prominent.

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PECAZINE ("PACATAL") COMPARED WITH AMYLOBARBITONE SODIUM IN ANXIETY STATES

By

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A REVIEW of the literature which is accumulating on the so-called tranquillizing drugs shows:

1. A relatively small number of adequately controlled trials with, in general, more conservative conclusions than those of the much greater number of uncontrolled trials (Foulds, 1958).

2. Diffuseness in patient selection, with subjects often being chosen for behavioural qualities (e.g. overactivity) or general characteristics (e.g. chronicity) rather than for diagnosis.

The second weakness may, in part, be explained by the desire to organize trials as quickly as possible. Part of the explanation for the first may be a not unnatural unwillingness to treat patients with a placebo if this involves withholding an effective treatment.

While in many categories there is uncertainty about the effectiveness of different drugs, it appears clear that amylobarbitone (or amylobarbitone sodium) has definite therapeutic properties in neurotic anxiety states and this has been shown in two recent controlled trials (Raymond *et al.*, 1957; Scott, 1955).

Pecazine (Mepazine, "Pacatal") has been previously assessed in controlled studies by Mitchell *et al.* (1957) in chronic psychotic female patients who found it effective as far as certain symptoms are concerned but too toxic for general use. Lomas (1957) and Thorpe and Baker (1956) compared pecazine with chlorpromazine, the former in new admissions with schizophrenia, paraphrenia and schizo-affective reactions, the latter in deteriorated schizophrenics. On the whole in both studies the results favoured chlorpromazine.

The manufacturer's literature, however, claims that Pacatal produces "tranquillity without dulling of alertness which often occurs with large doses of sedatives or other ataractic drugs" and also that it is "effective and the remedy of choice in a wide variety of psychiatric disorders; anxiety and tension states, phobic reactions . . ." etc. These claims are in effect assessed in the following study.

METHOD

A "double blind" trial was conducted with out-patients diagnosed as suffering from anxiety states. The method described by Davies and Shepherd (1955) was adopted and prescriptions for the drugs—amylobarbitone and

pecazine—were sealed in envelopes and thoroughly shuffled. The tablets—containing 1 gr. amylobarbitone sodium or 25 mg. pecazine—were identical in appearance and only the pharmacist was aware of the actual drug used on any patient until the end of the trial period.

Each patient was examined at an initial interview and the actuarial date, diagnosis, prognostic rating, a clinical assessment of intelligence, previous treatment, previous history of mental illness, symptom score and personality rating were recorded. The initial prescription for 1 tablet twice daily was then issued. The patient was seen again after a fortnight and the symptom score again recorded. The dose of tablets was raised from 1 to 2 t.i.d. if improvement was not evident. The patient was seen a third time after four weeks and the symptoms again recorded. The symptoms about which definite enquiry was made are listed below (Tables IIIa and b). Symptoms volunteered were added to this list.

GROUP MATCHING

Twenty-five consecutive cases were treated in all, in three out-patient departments. Eleven patients completed one month on pecazine but one was not examined by the author at the end of the month trial owing to his absence from the clinic. Ten patients completed one month on amylobarbitone sodium but one was not seen at the second visit again owing to the author's absence. Twenty-one patients, therefore, completed the trial period.

One patient discontinued pecazine because of unpleasant effects which were attributed to the drug and one patient discontinued amylobarbitone for the same reason. Two further patients failed to return for assessment after the course of treatment was prescribed and both of these were given pecazine (see Table I).

TABLE I

				Number of observations
				Amylobarbitone
				Subjects
				Total
Commencement of Trial	..	14	11	25
At two weeks		11	9	20
At four weeks		10	10	20

The prognosis rating was after Davies and Shepherd (1955) simply based on a three-point scale from "1" indicating the best prognosis to "3" indicating the worst.

The symptom chart was constructed from standard textbooks (Henderson and Gillespie, 1950; Curran and Guttman, 1947; Mayer-Gross *et al.*, 1954) and from the reported toxic effects of the drugs used (Martindale, 1958; Meyler, 1957; A.M.A. Council on Drugs, 1958). The symptoms were recorded as mild or severe (Tables IIIa and b). Some have been reported both as toxic effects of the drugs as well as symptoms of anxiety states (Table IIIb). For scoring purposes a mild symptom was valued at 1 point and a severe symptom 2 points. The patient was required to define the severity of the symptoms.

The two groups (totalling 21 patients) who completed the trial corresponded closely (Table II) in their sex distribution, age, civil state, personality types,

TABLE II

Comparison of Pecazine and Amylobarbitone Sodium Groups

						Pecazine	Amylobarbitone Sodium
Sex: Female	..	..	..	..	..	7	8
Male	..	..	..	..	..	4	2
Age: -20	..	..	..	..	..	1	1
-30	..	..	..	..	..	6	3
-40	..	..	..	..	..	2	5
-50	..	..	..	..	..	1	1
-60	..	..	..	..	..	1	-
+60	..	..	..	..	..	-	-
Civil state: Single	..	..	..	..	..	1	1
Married	..	..	..	..	..	10	9
Separated, etc.	..	..	..	..	..	-	-
Clinics attended: A (urban)	..	..	..	..	..	7	3
B (semi-urban)	..	..	..	..	..	1	2
C (metropolitan)	..	..	..	..	..	3	5
Length of illness: 1 year	..	..	..	..	..	7	6
-2 years	..	..	..	..	..	2	1
+2 years	..	..	..	..	..	2	3
Intelligence assessed clinically: Above average	..	..	..	..	..	3	6
Average	..	..	..	..	..	7	3
Below average	..	..	..	..	..	1	1
Prognosis rating: 1	..	..	..	..	..	5	5
2	..	..	..	..	..	4	4
3	..	..	..	..	..	2	1
Previous treatment recorded in current attack	..	..	..	..	..	6	6
No. of previous attacks: 1	..	..	..	..	..	4	5
2	..	..	..	..	..	1	-
3+	..	..	..	..	..	-	-
Night sedation used	..	..	..	..	..	7	5
Previous attack treated by:	..	..	..	..	..		
Conservative measures	..	..	..	..	..	5	4
Physical treatments	..	..	..	..	..	-	1
Leucotomy	..	..	..	..	..	-	-
Precipitant: Illness	..	..	..	..	..	2	-
Work	..	..	..	..	..	3	2
Finance	..	..	..	..	..	1	1
Housing	..	..	..	..	..	-	1
Domestic	..	..	..	..	..	5	6
Personality type: Obsessive	..	..	..	..	..	1	5
"Neutral"	..	..	..	..	..	1	1
Hysteroid	..	..	..	..	..	9	4
Total symptom score: Mean	..	..	..	..	..	37.8 ± 15.2	38.7 ± 10.4

precipitating factor, duration of illness, type of treatment given previously and concurrently, clinical assessment of intelligence, prognosis as estimated by the psychiatrist, symptom total scores and symptom frequency.

The personality type was defined as obsessive or hysteroid (according to which characteristic predominated) or neutral if the scores for the different characteristics cancelled each other out, using the rating scale devised by Foulds and Caine (1958). In a small number of cases records were kept of weight, pulse rate, blood pressure, red cell count, white cell count, plasma alkaline phosphatase, thymol turbidity and serum bilirubin level. No significant variation was noted between patients or groups in these measures and as they were time-consuming and often offensive to the patients they were abandoned.

TABLE IIIA

Comparison of Symptoms of Anxiety States in Pecazine and Amylobarbitone Groups

	Pecazine				Amylobarbitone Sodium			
	A	B	C	D	A	B	C	D
1. Tremor	4	5	14	4	3	1	5	10+
2. Fidgety	7	4	15	3	5	4	13	5
3. Muscle twitching	4	1	6	10+	1	2	5	9
4. Paraesthesiae of limbs	6	1	8	10	5	2	9	10+
5. Headache	4	2	8	10	2	6	14	4
6. Muzziness or pressure	3	3	9	9	4	5	14	4
7. Tension, strung up, anxious, unrelaxed	0	11	22	1	2	8	18	1
8. Could scream or smash	5	4	13	5	3	4	11	7
9. Could cry	7	4	15	3	3	6	15	3
10. Can't get off to sleep	3	3	9	9	3	4	11	7
11. Sleep broken or restless	4	4	12	6	4	3	10	8
12. Wakes early	3	2	7	10+	4	2	8	10
13. Dreaming more	3	4	11	7	3	1	5	10+
14. Frightening dreams, nightmares	2	3	8	10	2	0	2	10+
15. Poor concentration	2	4	10	8	5	5	15	3
16. Loss of interest	4	4	12	6	1	5	11	7
17. Loss of pleasure	3	6	15	3	1	6	13	5
19. Tinnitus	1	0	1	10+	4	1	6	10+
20. Blurred vision	3	2	7	10+	4	0	4	10+
21. Spots before eyes	3	0	3	10+	1	1	3	10+
24. Worrying about trivialities	2	7	16	2	2	7	16	2
25. Asocial	2	6	14	4	1	3	7	10+
26. Ideas of reference	4	4	12	6	3	3	9	9
27. Phobias: a. Insanity	4	2	8	10	0	5	10	8
b. Disease	0	2	4	10+	1	2	5	10+
c. Crowds	0	3	6	10+	0	0	0	10+
d. Enclosures	1	2	5	10+	1	3	7	10+
e. Spaces	0	0	0	10+	1	0	1	10+
f. Others	1	1	3	10+	1	2	5	10+
28. Palpitations, throbbings	4	2	8	10	2	3	8	10
29. Pains or pressure in chest	2	1	4	10+	3	1	5	10+
31. Flushing or blushing	4	1	6	10+	3	1	5	10+
33. Sweating	3	3	9	9	5	2	9	9
34. Loss of weight	3	1	5	10+	3	1	5	10+
36. Anorexia	6	1	8	10	4	2	8	10
37. Globus	2	1	4	10+	3	0	3	10+
42. Frequency of micturition	3	2	7	10+	1	2	5	10+
43. Amenorrhoea	0	0	0	10+	2	0	2	10+
44. Loss of libido	3	3	9	9	1	5	11	7
45. Impotence	0	1	2	10+	0	1	2	10+

TABLE IIIB

Comparison of Symptoms of Anxiety States Equally Reported as Side-Effects of Drugs

	A	B	C	D	A	B	C	D
18. Fatigue, Lassitude	3	5	13	5	4	4	12	6
22. Dizziness, vertigo	3	2	7	10+	4	0	4	10+
23. Irritable or excitable	5	3	11	7	5	4	13	5
30. Fainting feelings	3	1	5	10+	3	0	3	10+
32. Pallor	1	0	1	10+	0	0	0	10+
35. Dry mouth	3	4	11	7	4	3	10	8
38. Dyspepsia	1	5	11	7	2	3	8	10
39. Flatulence, fullness	2	2	6	10+	1	3	7	10+
40. Constipation	0	4	8	10	0	4	8	10
41. Diarrhoea	2	1	4	10+	2	0	2	10+
46. Drowsiness	0	1	2	10+	0	1	1	10+

A = Number of subjects reporting mild symptoms.

B = Number of subjects reporting severe symptoms.

C = Total score on symptom for group.

D = Rank order of symptom.

RESULTS OF TREATMENT

The results in individual patients' total symptom score is shown in Table IV.

TABLE IV
Results of Treatment. Total Symptom Scores

Pecazine					Person- ality Type	Amylobarbitone Sodium					Person- ality Type
Patient		Interview				Patient		Interview			
		1	2	3				1	2	3	
A	..	43	36	36	H	O	..	41	20	27	H
B	..	24	10	6	H	P	..	50	13	18	H
C	..	29	20	37	N	Q	..	25	5	5	O
D	..	41	44	34	H	R	..	48	36	19	H
E	..	41	39	30	H	S	..	21	18	5	O
F	..	41	36	43	O	T	..	35	13	11	H
G	..	51	52	50	H	U	..	52	25	22	O
H	..	74	69	67	H	V	..	32	28	17	N
I	..	25	17	18	H	W	..	49	19	24	O
J	..	15	13	11	H	X	..	34	—	29	O
K	..	32	25	—							
L	..	35*			H						
M	..	33*			H						
N	..	13†			H	Y	..	40†			H

*=failed to return.

†=discontinued through side effects.

O=Obsessional.

N=Neutral.

H=Hysteroid.

The mean reduction (and S.D.) in the symptom score after two weeks is 5.5 ± 4.6 for pecazine treated patients and 19.56 ± 11.6 for amylobarbitone treated cases ($n=18$, $t=7$, $p<0.001$). After one month the pecazine cases show a reduction of 4.6 ± 6.5 and the amylobarbitone cases of 21.0 ± 8.7 ($n=18$, $t=9$, $p<0.001$). These differences are highly significant.

As far as individual symptoms are concerned, the group total score was reduced by half or more than half in 8 of 51 symptoms in the pecazine group and 33 of 51 in the amylobarbitone group ($\chi^2=23$, $p<0.001$). Of 276 symptoms recorded by the pecazine subjects 42 were not reported after the first interview. Of 255 symptoms recorded by the amylobarbitone subjects 78 were not again reported ($\chi^2=15$, $p<0.001$).

On the other hand 50 new symptoms were recorded in subsequent interviews in the pecazine group and only 23 were likewise recorded in the amylobarbitone group. Irritability or excitability (3 subjects), a feeling that the patient could scream or smash (3 subjects) and loss of libido (3) were reported only with pecazine as were loss of interest (2), faint feelings (2), dizziness (2), anorexia (2). Tremor (2) was reported only with amylobarbitone. Dry mouth was reported equally (3 subjects in each group) as was fatigue (2 subjects in each group).

CONCLUSIONS

It can be seen that on comparing the results in two closely matched groups of patients with anxiety states, pecazine ("Pacatal") in doses of 25–50 mg. t.d.s. is inferior to amylobarbitone sodium in doses of 1–2 mg. t.d.s. Pecazine is, moreover, associated more frequently with the development of new symptoms than amylobarbitone; and finally, at the time of writing is almost exactly ten times as expensive as amylobarbitone in the minimum doses used.

ACKNOWLEDGMENTS

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PERIVASCULAR CAVITATION OF THE BASAL GANGLIA IN GARGOYLISM

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PERIVASCULAR cysts visible to the naked eye have been described in the brain of several cases of gargoylism (Lindsay *et al.*, 1948; Henderson *et al.*, 1952; Naidoo, 1953). In most instances they were small, not exceeding 1 mm. in diameter and confined to the white matter of the cerebral hemispheres. The present case is remarkable for the exceptional size of the perivascular cysts which had led to gross bilateral cavitation of the thalamus and putamen.

CASE REPORT

Clinical History

E.L., male, aged 17 years, was the second of a family of six children, the fifth of whom is also a boy and suffers from gargoylism. No other cases of gargoylism are known to have occurred in either parent's family. The patient was first seen at the age of five years when he could say only a few words; at this time he was a rather short, broad child with a large head, coarse features, wide nose, large clumsy hands, genu valgum, abdominal enlargement, hepatomegaly and complete deafness.

By the age of twelve years he presented the typical appearance of gargoylism with stunted growth, short neck, dorso-lumbar kyphosis, very protuberant abdomen with gross hepatosplenomegaly, broad claw-like hands, thickened wrists and elbows with limitation of extension and supination at the wrists and pes cavus. The head was large and the face grotesque with prominent supraorbital ridges, depressed bridge of nose, broad nose, thickening of lips and below the eyes and a rather large tongue; there were no corneal opacities. There was a constant mitral systolic murmur. He was mentally retarded and was considered to be uneducable although he attended an occupation centre. He was quite deaf but had learnt to lip read and could say a few words.

During the following five years he was admitted to hospital on a number of occasions for various infections and bronchitis. Three months before death he developed bronchospasm which became steadily worse and was aggravated by an inability to expectorate. He finally became cyanosed on exertion and developed signs of cardiac failure. He died suddenly during an attack of severe bronchospasm.

Necropsy Findings

Heart (205 g.): marked nodular thickening of both cusps of mitral valve with short thick fibrous chordae tendinae; the aortic cusps were slightly thickened and nodular. Patchy intimal thickening of the thoracic aorta resembling early atheroma.

Lungs (R. 174 g., L. 162 g.): both show extensive collapse only.

Liver (1,332 g.), *spleen* (134 g.), *pancreas*, *adrenals* (together 10 g.), *kidneys* (R. 117 g., L. 114 g.), *gastrointestinal tract*, *thymus* (20 g.): normal.

Both *testes* were descended and of pre-pubertal size. The pituitary fossa was wide but the pituitary appeared normal.

No abnormalities were noted in the right femur or costo-chondral junction.

Microscopical Findings

Liver: The general architecture was preserved but almost all parenchyma cells were slightly enlarged and showed numerous small vacuoles in the cytoplasm with a central nucleus; some contained a single large vacuole displacing the nucleus to one side.

Periodic Schiff, mucicarmine, Scharlach R, Sudan black and Nile blue sulphate on both formalin fixed and alcohol fixed material failed to stain any cytoplasmic inclusions.

The *mitral valve* and chordae tendineae showed markedly increased collagen with many large cells with small nuclei and copious vacuolated cytoplasm scattered throughout. The myocardium was normal.

The *main coronary arteries* showed intimal proliferation with large vacuolated cells here and there although the smaller branches appeared normal. Similar changes of lesser degree were present in the thoracic aorta particularly around the origins of the intercostal arteries.

Mediastinal and mesenteric lymph nodes were characterized by considerable dilatation of the sinusoids which were crowded with vacuolated cells whilst the lymph follicles were small and scanty. Tonsil, lymphoid tissue in the pharyngeal wall, spleen and thymus showed no such cells.

Both *testes* were infantile and showed no evidence of spermatogenesis.

Lungs, pancreas, adrenal, kidneys, thyroid, pituitary and *costo-chondral junction* appeared normal.

EXAMINATION OF THE NERVOUS SYSTEM

Macroscopic Appearances

The brain was large and weighed 1,650 g. before fixation. The convolitional pattern was normal and the leptomeninges did not appear thickened. Coronal sections of the fixed brain revealed considerable dilatation of the lateral ventricles. The basal ganglia were studded with numerous cysts of various sizes, up to 1 cm. in diameter and separated from each other by thin walls of intervening brain tissue. They were most numerous in the thalamus and the central part of the putamen; only a few small cysts were visible at the level of the head of the caudate nucleus. Numerous small cysts, not exceeding 1 mm. in diameter, could be seen in the white matter, mainly in the cores of the gyri in close proximity to the cerebral cortex (Fig. 1). The brain stem and cerebellum appeared normal.

Histology

Representative frozen sections were taken from the cerebral cortex, basal ganglia, brain stem and cerebellum and stained with carbol azure, Kultschitsky-Pal's method for myelin, Holzer's stain for glia, Herxheimer's Scharlach R and P.A.S. A coronal block of one hemisphere was embedded in celloidin and sections stained with carbol azure, Heidenhain's method for myelin, van Gieson's stain and P.A.S. In addition a block of the basal ganglia was embedded in paraffin and stained with van Gieson's method and with Gomori's reticulin stain.

Cerebral cortex: Neuronal storage, though widespread, was not ubiquitous and rather inconspicuous. Obvious swelling of the cell bodies was rare and most storage cells contained only a few granules of lipid which might easily be overlooked in Nissl preparations, but stained brilliantly with P.A.S. and a dull

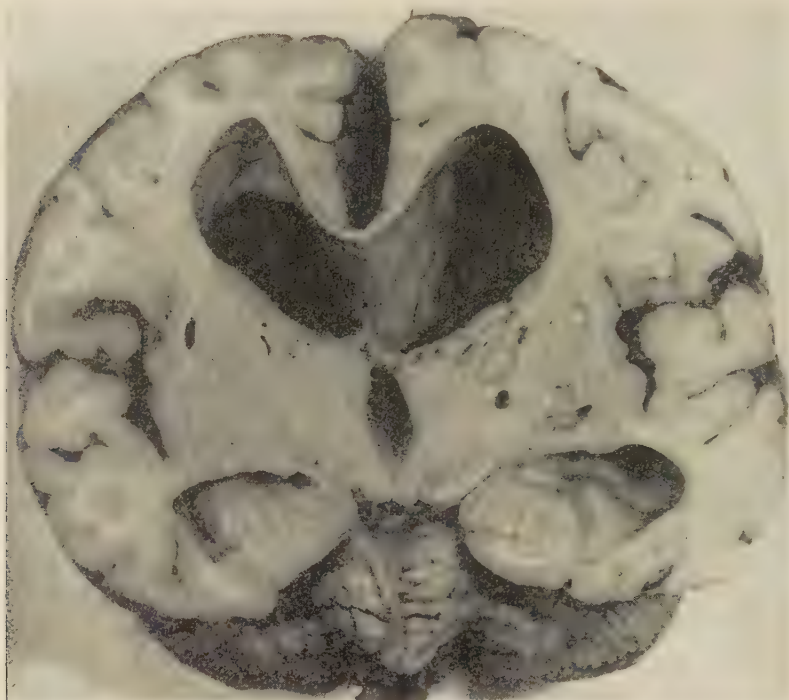


FIG. 1.—Coronal section of brain showing internal hydrocephalus, cavitation of basal ganglia and small cysts in the white matter.

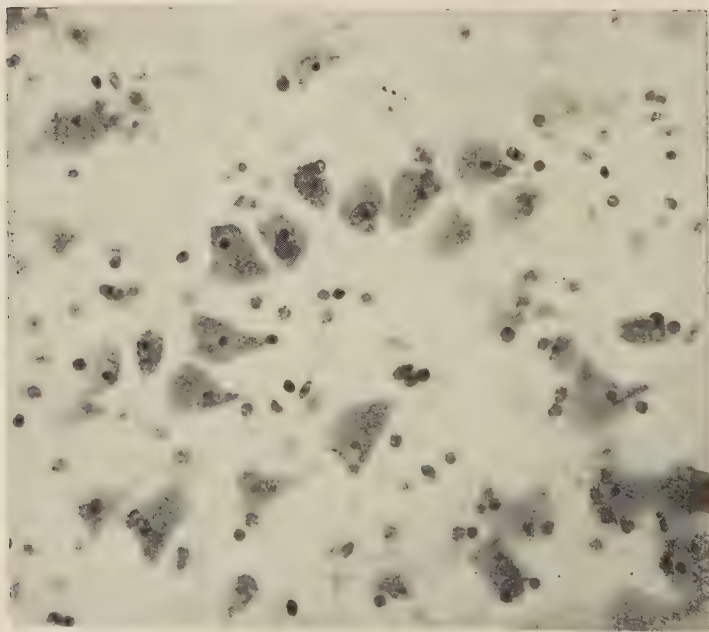


FIG. 2.—Group of nerve cells from the left hippocampal gyrus showing storage. Carbol azure $\times 400$.

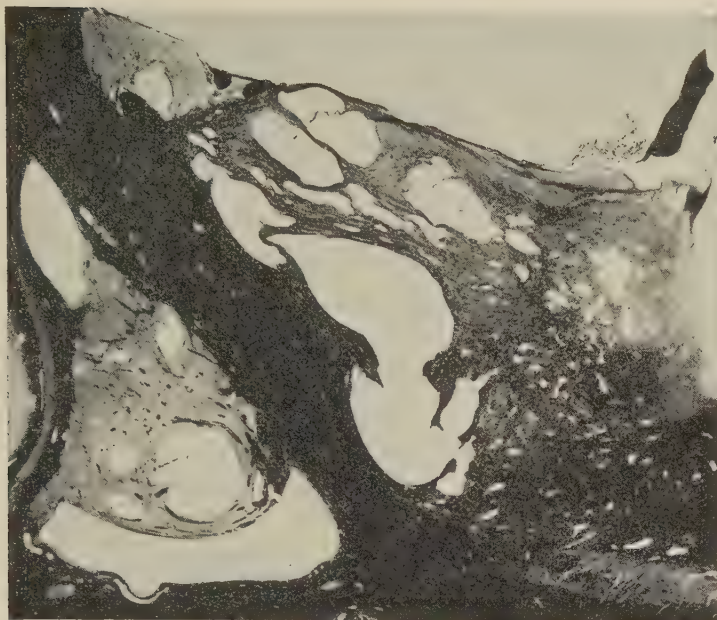


FIG. 3.—Cavitation of left putamen, caudate nucleus and thalamus. Heidenhain's myelin stain $\times 3.5$.

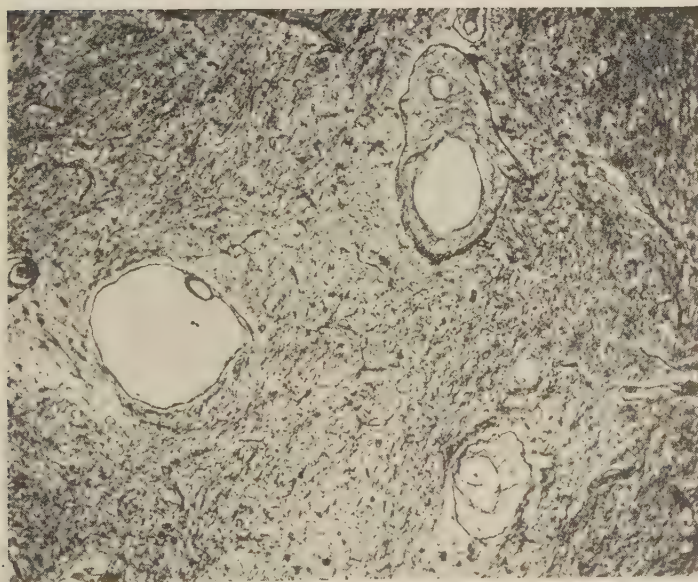


FIG. 4.—Adventitial proliferation around blood vessels in left thalamus; on the left a small cyst displacing the vessel and perivascular network towards the periphery. Gomori's reticulin stain $\times 75$.

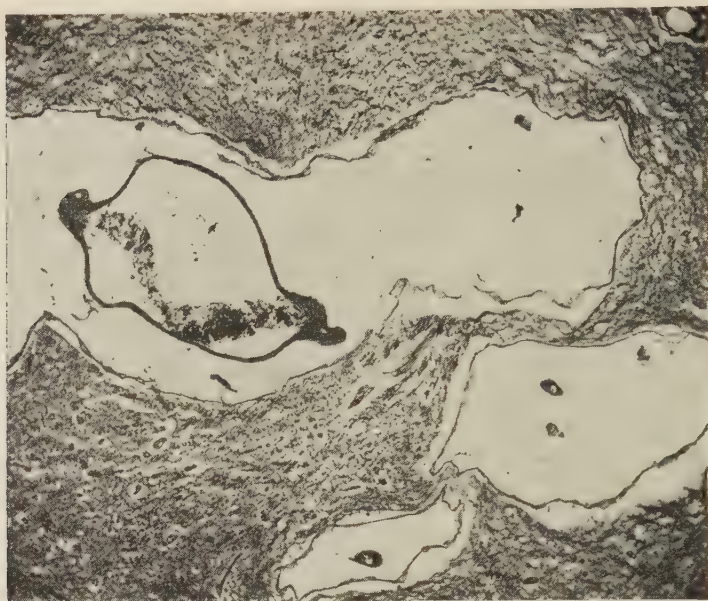


FIG. 5.—Large cysts in left thalamus lined with thin layer of reticulin fibres; the vessels lie apparently free in the lumen. Gomori's reticulin stain $\times 70$.

greyish yellow with Scharlach R. The large pyramidal cells of LIII, and to a lesser extent those of LV were mainly affected. In the hippocampal allocortex storage was confined to the end plate and the subicular cortex while the sectors h1 and h2 were unaffected (Fig. 2). The cytoarchitecture of the cortex was well preserved, myelination was normal and there was no gliosis.

Cerebral white matter: Myelination was normal and fibrillary gliosis confined to the subependymal layer. Several blood vessels showed marked adventitial thickening; a few small perivascular cysts were also present, resembling in structure those found in the basal ganglia.

Basal ganglia: The most conspicuous lesions were found in the neighbourhood of blood vessels, ranging from adventitial thickening to the formation of large, apparently empty cysts (Fig. 3). Adventitial thickening could be seen around vessels of various calibre, both arterial and venous. It formed a wide clear zone around the vessel containing remarkably few cellular elements, and filled with sometimes a dense, sometimes a loose meshwork of collagen and reticulin fibres. In some of these areas the meshwork became so loose towards the periphery that it formed a few small cystic spaces (Fig. 4). Around some vessels these spaces had become confluent, forming a single large cyst and displacing the vessel and the remnants of its fibrous meshwork to the periphery. In the largest cysts the meshwork appeared to have been absorbed and the vessel lay loose in the lumen of a large cavity lined with a thin layer of collagen and reticulin fibres (Fig. 5). The cysts appeared completely empty and devoid of any cellular elements, but wherever the fibrous meshwork persisted a few cells of adventitial origin were also present, together with a variable, but generally scanty, number of microglial cells a few of which contained droplets of neutral fat. The intervening brain tissue showed considerable loss of nerve cells, particularly in the thalamus, and mild fibrillary gliosis. Most of the surviving cells showed some evidence of storage.

Brain stem: Some evidence of neuronal storage could be seen in most cells, but was conspicuous only in a few of the large cells of the motor nuclei and even there it never reached an extreme degree of ballooning. There was a mild diffuse fibrillary gliosis with marginal and subependymal accentuation; the inferior olives also showed a moderate excess of glial fibres.

Cerebellum: As in other parts of the brain, storage in the cell bodies was slight. On the other hand the dendrites of the Purkinje cells showed numerous very large spherical or ovoid expansions filled with material similar to that found in the cell bodies. Myelination was normal and gliosis largely confined to the capsule and the hilum of the dentate nucleus.

Meninges, ependyma, choroid plexus: The leptomeninges were not obviously thickened, but were slightly more cellular than usual and contained a considerable excess of collagen fibres. The lateral ventricles were largely denuded of ependyma which was replaced by a layer of fibrillary glia. The choroid plexuses showed normal papillary structure with healthy epithelium, but the vascular cores of the villi were thickened and showed an excess of dense collagen fibres.

DISCUSSION

The most striking finding in this case was the presence of large cystic spaces in the basal ganglia which were perivascular in distribution and had a lining consisting of collagen and reticulin fibres. All transitional stages between the well-known adventitial thickening (Tuthill, 1934) and the large cystic spaces have been demonstrated. Both the size and the localization of these cavities were unusual features. Large cysts, up to 6 mm. in diameter, were described by Naidoo (1953) in the cerebral white matter and in the corpus callosum and Lindsay *et al.* (1948) found a large solitary cyst in the internal capsule of their Case 2. Only minute cysts were found in the basal ganglia of their Case 5. In none of the previously recorded cases have there been cystic changes in the putamen and thalamus comparable with those found in the present case.

The adventitial proliferation and fibrosis which appears to precede these cystic changes has been confined to the white matter in the majority of cases but Tuthill (1934) found similar changes in the striatum and thalamus. Its cause is obscure, but it may be related to the similar fibrosis frequently found in the leptomeninges and probably responsible for the development of hydrocephalus in these cases (Russell, 1949). She ascribes the meningeal fibrosis to a reaction to the irritation caused by abnormal lipid stored in the arachnoid cells, but it may be suggested that the condition is an expression of a disorder of polysaccharide metabolism similar to that held responsible for lesions in other connective tissue structures such as the periosteum or the valves of the heart. The storage in connective tissues may be both intracellular and extracellular (Lindsay *et al.*, 1948) and it is possible that excessive extracellular accumulation of the stored substance may lead to rupture and displacement of the fibrous network and consequently to the formation of cysts.

The nature of the contents of these cysts has never been elucidated. Both Lindsay *et al.* (1948) and Henderson *et al.* (1952) describe it as mucoid. In the present case the brain was preserved in formalin for a long time and the substance appears to have diffused out. If the material is indeed a polysaccharide similar to that found in the liver (Bishton *et al.*, 1956) it is notoriously diffusible in fixatives which accounts for the failure of staining it in the tissues.

It is of interest to note that the case presented here was a boy with clear corneae and deafness who had a similarly affected male sibling. The existence of

a genetic variant of gargoylism transmitted as a sex-linked recessive and associated invariably with clear corneae has been recently established. The first family tree suggestive of this mode of inheritance was reported by Wolff (1942). The association of this variant with absence of corneal opacities was pointed out by Njå (1945-6) and confirmed by Millman and Whittick (1952) and by Cunningham (1954). It is probable that several other reported familial cases confined to male siblings belong to the same type (Reilly, 1935; Cockayne, 1936; de Lange *et al.*, 1936, 1944; Ross *et al.*, 1941; Lurie and Levy, 1944). It may, however, be pointed out that clear corneae are also occasionally found in female "formes frustes" of gargoylism (Nonne, 1924; Jervis, 1950).

It is remarkable that most of the males without corneal opacities showed some degree of deafness. In the few instances in which detailed otological examination was undertaken an inner ear type of deafness was found (Wolff, 1942; de Lange *et al.*, 1944). In the same two cases post-mortem examination revealed lesions in the organ of Corti. Isolated cases of deafness have also been recorded in the classical type of gargoylism in both sexes, but in at least one instance the deafness was of conductive type (Meyer and Okner, 1939).

Not enough information is available to indicate differences in the pathology of the two main genetic types, but apparently the lesions in both types show a wide range of individual variation. In the case of de Lange *et al.*, (1944) lesions were confined to the liver, heart and cartilages of the respiratory tract, while the brain and the reticulo-endothelial system were unaffected. The present case showed cardiovascular, hepatic and cerebral lesions; in addition numerous foam cells were found in the lymph nodes, but not in other parts of the reticulo-endothelial system.

Nothing is known about possible differences in the chemical composition of the organs in the two types of gargoylism. Lipid analysis of the brain carried out on fixed material in this case yielded similar results to those found in the classical case of Bishton *et al.*; in both the values obtained were within normal limits (Tingey, 1959). More work is wanted on the nature of the polysaccharides stored in various organs, but this can only be carried out on fresh unfixed material.

SUMMARY

A case of gargoylism has been described in which the most striking pathological feature was the presence of extensive cavitation of the basal ganglia of the brain. These spaces were perivascular and differed from the small cysts commonly found in the cerebral white matter in gargoylism only in their size and localization.

The patient was deaf and had no corneal opacities and there was a similarly affected male sibling. The case may therefore belong to that variant of gargoylism in which there is a sex-linked recessive mode of inheritance.

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GILLES DE LA TOURETTE'S DISEASE

By

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IN its classical form this peculiar disease is characterized by an irresistible compulsion to swear, together with motor tics. First recorded by Itard in 1825, it was later fully described (1885) and followed up (1899) by Gilles de la Tourette, whose name has been given to the condition. Associated with the compulsive utterances are multiple motor tics, hence Convulsive Tic is a synonym for the malady. The motor movements are more severe and widespread than those met with in simple tic, and they may involve the whole body in a violent spasm. Facial grimaces, violent jerks of the head, limbs and trunk may occur, often combined with an explosive utterance. This exclamation may consist of an unorganized sound such as a bark or a groan or a grunt. Or it may be a word—frequently of an obscene nature (coprolalia) which greatly embarrasses the patient. Other features of the condition are echolalia—the impulse to repeat sounds or words which the patient hears, and echopraxia—the compulsion to copy the actions of others.

The onset of the disease usually occurs in childhood with multiple motor tics. Later compulsive sounds occur, leading on to obscene utterances, and features of an obsessive-compulsive neurosis may be present. All writers give a uniformly bad prognosis for the condition. Kinnier Wilson (1955) states that the only case he tended personally ended in insanity. This was also the experience of Gilles de la Tourette. Of 15 cases reported by Ascher (1949), Heuser (1953), and Mahler, Luke and Daltroff (1955), four developed schizophrenic psychoses.

The condition is rare, and until 1957 there had been no recent recorded cases in the English literature. However, Michael (1957) gave a good description of a case recently treated in the Maudsley Hospital. This patient was a man of 28 who developed tics at the age of 7. At first labelled chorea, it was later diagnosed as habit spasm at Great Ormond Street Hospital for Children. At 9 the patient made involuntary noises, and at 13 explosive swearing commenced. He was symptom free for two years (18–20) while in the Army. Then his symptoms gradually returned, and finally he was unable to control his violent swearing. He became a recluse, unable to work or to leave his home. At the Maudsley Hospital, psychoanalytically orientated psychotherapy was ineffective, but CO₂ inhalation therapy was very helpful. He had four treatments per week, totalling 30 treatments. The coprolalia and motor tics disappeared, and only a residual vocal tic like a hiccough remained. When reported the patient had been back at work for 15 months.

In view of its extreme rarity in England I am prompted to report the following two cases, recently seen, which conform to the description of Gilles de la Tourette's disease.

Case History: 1

The patient is a man of 65 who complains of compulsive shouting, together with violent body jerks. His first symptom occurred at the age of 5 when he started school. It consisted of facial tics, mainly grimacing, and it was soon followed by jerking movements of the arms. The onset of the symptoms, according to the patient, occurred after he was forced to use his right hand at school, though he was naturally left-handed. He is now ambidextrous and left-footed. He never stammered. His sister's child is left-handed. At 6 he attended Great Ormond Street where a diagnosis of chorea was made. At 12 he came under the care of the National Hospital, Queen Square, where a diagnosis of tic was made. He was treated under Gordon Holmes and Kinnier Wilson with "complete isolation, cold douches down the spine, and faradism". Unable to attend school from 6 to 12 owing to his violent tics, he nevertheless learned to read and write and it was clear that he was above average in intelligence. At about 8 he developed a vocal tic—"just a little pip sound". This gradually increased in intensity over the next 4-5 years, but at 14 he improved considerably and he started work. At 18 the tics had subsided sufficiently for him to take up the violin. At 19 he was called up into the Army (1916), but he was soon discharged because of his vocal and motor tics. He became a master electrician and worked for 32 years with the Eastern Electricity Board, with whom he reached the responsible position of electrician foreman. During most of this period he managed to keep his symptoms under control. With an effort he would keep his vocal tics down to a minimum, though occasionally a loud "bark" would occur.

His illness showed remissions and exacerbations over the years. Symptoms were marked in 1940, and again were severe in 1951. At this time he attended St. Thomas's Hospital where motor tic was diagnosed and myanesin was prescribed, but with no effect on his symptoms. Early in 1958 there was a severe exacerbation of the malady and he again attended the National Hospital. His vocal tic had now assumed the proportions of a loud roar. Anyone unprepared for the noise was liable to be startled by it. The roaring bark was occurring every 5 to 10 minutes during the day. Treatment by tracheotomy was suggested to reduce the noise, and even leucotomy was considered. However, no surgical treatment was carried out.

The recent history is that for the past 18 months symptoms have been more severe than ever before. His roaring bark rendered his life at work, and indeed anywhere outside his home, most embarrassing. Due to their violence and uncontrollability, his symptoms forced him to retire from work and he became a recluse, hardly daring to leave his house. The main symptom was a sudden roaring, barking sound, produced by a violent exhalation against a partially-closed glottis. The sound is loud enough to be heard from several hundred yards distance. Sometimes, when commencing to speak, the first word of the sentence would be shouted violently, usually in a distorted form. However, it was only in this circumstance that his vocal tic involved words. Otherwise the exclamation was an unorganized sound, loud, roaring or barking, often emanating from the corner of his mouth, with the head turned to one side. He looked and sounded like a man swearing, though in fact he was not doing so. He felt no compulsion to swear, but the roaring utterance was frequently irresistible. Sometimes he was unable to speak for fear of shouting.

Combined with the loud utterances, but also occurring independently, were violent sudden movements of the body. These were usually symmetrical, involving mainly the shoulders, arms and head. However, anterior abdominal wall muscles, leg, and facial muscles were all occasionally thrown into violent spasm.

Symptoms were always worse when he was under stress, or worried, or emotionally disturbed. Symptoms never occurred during sleep, neither did they occur during general anaesthesia for tooth extraction. Alcohol always improved the condition, and when he had to leave his house a glass of beer made it easier for him to control the vocal tics. Under certain conditions symptoms were always worse, for example at the barber. His dentist protested that extracting a tooth was more unnerving for him than the for patient in view of the loud accompaniment. It also had an unfavourable psychological effect on other patients in the waiting room next door.

He could sometimes, but not always, suppress the symptoms by an effort of will, but he would feel an "inward tremble" until he jerked violently or made his loud sound. He would then feel temporarily relieved for a short time until the next spasm occurred. He was never thrown to the ground by his spasms. Resting quietly in a chair, or relaxing in bed always reduced the spasms. However, they occurred as often when he was alone as when he was in company. The worst time of the day was when he left home for work, and also when undressing at night to retire to bed.

The patient is married and he has two children, one of whom is described as "highly strung". His father was a heavy drinker who died of tuberculosis, and his mother is described as a very anxious, worrying type. Of his two brothers one drinks heavily, and the other died of a stroke at 52. His only sister is well.

The patient's personality is of obsessional type. He is fastidious, accurate, precise, neat and tidy, and a conscientious worker. His present mental state is dominated by a paranoid, suspicious attitude. He suspects that he is disbelieved when he tells his story. He frequently emphasizes that he has "proof", for example, that he was in the Army, or attended the National Hospital. He will not go outdoors if he can avoid it because he feels everyone looks at him and talks about his peculiar shouting. This, of course, is probably true. But it has resulted in a hostile, aggressive and defensive attitude towards society.

The patient was treated, empirically, with chlorpromazine. Commencing on 25 mg. t.d.s., the dose was increased from 50 to 75 mg. t.d.s. There was a rapid and remarkable response to this drug. The motor spasms became much less frequent and the vocal tics almost completely disappeared. He found the courage to leave his house. He visited his doctor's surgery without giving his usual warning barks, usually audible before he reached the house. He queued for a bus in silence. At the time of reporting this case the patient has been on the drug for six weeks and he is almost symptom free. For 18 months prior to the exhibition of chlorpromazine his symptoms had been worse than ever before. Only occasionally does he shout or have motor tics now. A day or more may pass without a single spasm, whereas previously vocal and motor spasms were occurring every five minutes or so.

Case History: 2

This patient is a man of 67 who complains of violent, spasmodic movements of the head and limbs, with grunting, barking and coughing exclamations. His symptoms commenced at the age of six with head shaking, followed by spasmodic jerking of the limbs. Later he developed involuntary exclamations. He was diagnosed as suffering from chorea at Great Ormond Street. There was a slow increase in his symptoms up to the age of twenty, after which he improved slightly. But from thirty onwards his symptoms have gradually increased in intensity. His present condition is that he has frequent, violent, sudden jerking movements of head, face, arms and legs. At the same time he makes an exclamation—usually a loud "Oh!" or "Ah!" Sometimes the words "No! no! no!" are shouted. As in the first case, words are only exclaimed at the beginning of a sentence, when they are usually produced in a distorted form. Frequently he disguises the exclamation behind a cough. His symptoms are always worse when he is excited, and they disappear during sleep. He is a rent collector and he rides his bicycle regularly without difficulty. His symptoms have never stopped him from working. Though he can voluntarily suppress his symptoms for a short period, he says that they "Come out in a rush of jerks and noise" eventually.

The patient is a very conscientious, hard-working man who has held one job for 31 years. His personality is of obsessional type, and he has some features of an obsessional neurosis, including *folie de doute* with frequent checking and rechecking his actions. His father had a tic consisting of blinking, and he stammered. The patient is right-handed.

In 1952 he was treated with electro-convulsive therapy at a General Hospital. This had no effect on his symptoms. He then had narco-analysis and psychotherapy, again without effect. Recently the patient was seen at the National Hospital where a diagnosis of Convulsive Tic was made.

As in the first case, the patient was treated with chlorpromazine, but unfortunately after a few weeks he developed chlorpromazine jaundice, and the drug had to be discontinued.

DISCUSSION

The remarkable similarity in the histories of these two patients is notable. By a coincidence both patients were seen within the space of a few weeks in the same general practice. Possibly the condition is not so rare as has been thought in the past. The excellent response to chlorpromazine in Case 1, and the early signs of improvement in Case 2 suggest that this drug should be the first line of treatment.

Both patients have many features in common with Michael's case (1957). In all three cases the onset was in childhood with multiple motor tics diagnosed as chorea. Vocal tics developed later. Then there was a latent period with abatement of symptoms, and a later recurrence of the condition in a more serious form. The natural history of the disease is marked by exacerbations and remissions, and a psychotic termination is a recognized outcome, as was mentioned earlier. In this connection, the paranoid features present in Case 1 are significant.

In considering the aetiology of the condition it is noteworthy that the majority of cases described in the literature have had features of an obsessive-compulsive neurosis. In view of this one must consider whether the vocal exclamations are compulsive components of such a neurosis. Alternatively, they may be tics. In a compulsive neurosis there is a conscious compelling impulse to perform a certain action. A motor tic (or habit spasm), on the other hand, is a much less organized action, presumably involving lower motor centres. It is frequently involuntary, but may be controlled with an effort.

Purves-Stewart and Worster-Drought (1952) define a tic as a co-ordinated purposive act, perpetuated as a recurrent involuntary movement, which occurs automatically, without conscious attention being directed to it. An obsessional compulsion, on the other hand, absorbs the patient's attention during its performance, and is accompanied by a feeling of irresistible obligation to perform it.

However, the difference between a tic and a compulsive action is not so obvious when it involves speech. The main differences here are:

1. Voluntary inhibition of a compulsion produces anxiety; inhibition of a tic does not produce anxiety.
2. It is frequently difficult and sometimes impossible to inhibit a tic, whereas a compulsion can nearly always be inhibited. In other words a tic may become involuntary, whereas a compulsion is always voluntary.
3. There is always some psychological symbolism underlying a compulsive action, whereas a tic is a more primitive less organized reaction with little or no symbolism.

The relationship of Tourette's disease to chorea is interesting and important in that it suggests that there may be an organic basis to the condition. Several of the cases described in the literature have been diagnosed as suffering from chorea in childhood. It will be noted that this diagnosis was made at the age of 6 at Great Ormond Street in the cases here described. Tics are well known to occur after chorea, and Lewis (1956) points out that Tourette's disease also may follow chorea. Turner and Critchley (1925) described the respiratory tics that may occur during or following encephalitis lethargica. The tics include yawning, sniffing, coughing and spitting. In addition, simple motor tics occur. The vocal tic of Tourette's disease involves the respiratory musculature in a very similar manner to these post-encephalitic tics.

SUMMARY

Gilles de la Tourette's disease is described, and a further two cases of this rare condition are presented. Treatment with chlorpromazine, not previously described, was remarkably effective.

The prognosis is usually poor, the disease often terminating in psychosis.

The aetiology is reviewed, and the differences between tics and compulsive neurosis are discussed.

The occurrence of tics after organic brain disease suggests that there may be an organic basis to this disease.

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TRIALS AND TRIBULATIONS

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WITH the advent of effective physical therapies, psychiatrists have become increasingly interested in the problems posed by clinical trials. Professor Bradford Hill, in the Preface to the Sixth Edition of his *Principles of Medical Statistics* (1) noted that “. . . passage of time has . . . brought clinical trials into prominence and fashion . . .”. More recently Professor Pickering has described the clinical trial as “the most important new method introduced into clinical science in recent years” (2). Some interesting differences between controlled and uncontrolled trials are well brought out in the paper by Foulds (3) in which he found that therapeutic success was claimed in 85 per cent. of studies not using control groups. Among those studies using control groups, however, only 25 per cent. obtained a positive result. He concluded that “claims for the success of a treatment are closely associated with absence of the means whereby these claims can be scientifically substantiated”.

This paper will discuss the use of clinical trials in psychiatry and the particular problems posed by this branch of medicine. We will first consider the clinical problems, next statistical methods, and lastly some suggestions for the future.

Clinical trials only become relevant when a new and potentially effective therapy is available. They can be extremely simple in design—i.e. the treatment of G.P.I. by malaria only required that a group of patients who undoubtedly had the disease received this treatment. In the usual course of events the illness is progressive to death. Any treatment which halted or averted this must be effective without any need for a control group, since all other patients form a control. Moreover, the attitudes of nurses and doctors may colour the clinical picture but do not alter the final outcome.

Quite a different problem is the treatment of schizophrenia. This disease too has acquired an evil reputation—partly because so many of the patients hoarded away in mental hospitals during the last century were suffering from it. With the advent of physical methods of treatment “cures” of this condition were claimed for 60 per cent. or more of the patients treated. If schizophrenia is an incurable disease, these are very good results, and no control group is needed. Schizophrenia however is not incurable and has a considerable spontaneous remission rate, and unfortunately a high relapse rate too. Allowing for a spontaneous remission rate of 30 per cent. in patients admitted to hospital (the natural remission rate of all schizophrenic illnesses occurring in the community is quite unknown), the clinics using physical treatment appeared to have an advantage. But active clinics attract treatable cases and it has become

apparent that some of the physical treatments are only effective in cases with a good prognosis, even without treatment. It is obvious that any treatment which is only given to those patients likely to recover will appear to be an effective therapy.

It is of major importance to realize that psychiatric patients respond to their human environment. The results of the same treatment will be different from hospital to hospital, and even from ward to ward. This invalidates the majority of studies comparing control groups in other hospitals or wards or in the same hospital at different times.

Even when comparable conditions for both treated and control groups are available, our problems have only begun. Again, to use schizophrenia as an example (although most other functional psychiatric disorders could be used)—there is no precise entity to treat. Some experts consider it is one disease, others as six diseases, and yet others a multiplicity of reactions to various stresses. There are considerable variations in the symptoms from country to country, and even within one country: i.e. the simple peasant girl will show a different clinical picture to the saucy cockney. The results obtained in a hospital serving a rural area will be different from those in a hospital serving an urban area.

Two groups of patients may differ in their ability to respond to treatment. Under present conditions this difference may not only be due to the usual variables of age, sex, heredity, etc., but will also be dependent on their previous exposure to therapy. For example, nowadays few patients arrive in hospital without having had a trial of one or other of the tranquillizing drugs. We are always treating, in hospital, a group of patients who have already been selected by their partial or complete failure to respond to this therapy in their home environment.

The criteria for results of treatment are at present unsatisfactory. We have no way of measuring the common symptoms of psychiatric illnesses, nor even the presence of many, with certainty. Discharge from hospital may depend as much on hospital policy as on the patient's condition. At times the most topsyturvy occurrences are noted: i.e. the paranoid patient may discharge himself from hospital at the height of his illness, but ask to be re-admitted when he has improved, acquired insight, and realizes his need for help. In countries with no National Health Service the duration of stay in hospital may be a reflection of the ability of the patient to pay rather than on the true duration of his need. The duration of stay can also be partly determined by legal requirements rather than medical.

Attempts to measure behaviour are only of value if we know the circumstances under which the behaviour occurs and the attitudes and expectations of the other persons concerned. It is striking that the reports of clinical trials usually reflect the expectations of those in charge at least as much as the effect of the therapy. We can recognize the personality of our colleagues from the reports of their clinical trials. These may vary from the enthusiast with marked success (but with no control group) to the cynic with everything carefully controlled who finds no positive results—"the nurses were warned not to allow the trial to influence their attitude to the patients"!

It is not possible to conduct a clinical trial in such a way that the nurses concerned do not know something of the treatment and *also* something of the attitudes of those in charge. All the current physical therapies have such obvious effects and side reactions that they cannot be concealed. The results of treatment are always end results of interaction between patient, therapy and nursing staff. The response of the latter to an enthusiastic programme is usually enthusiastic

—to an ambiguous programme such as is presented by “double-blind” trials, it will be ambiguous—and this is likely to be reflected in the results. Those who insist that the nurse must not know which treatment is being given will tend to eliminate enthusiasm and produce an atmosphere in which nothing particular is expected—and such expectations are often fulfilled.

Reports in the Journals of new methods of treatment may be misleading, for the simple reason that in general only successful results are recorded. Many trials which show little benefit are either abandoned or not considered to justify reporting. Psychiatrists, as well as patients, live in and respond to a human environment. Who is there who wishes to be the first to report, or print a report, on a failure?

Some may feel that these problems are solved by applying a statistical analysis to the results of the trial. We will therefore examine the application of statistical methods and the logic of statistical analysis.

If we can regard the drug trial as an example of a scientific technique, an attempt is being made to establish a causal relation between drug and subsequent effect. This requires that two *identical* patients be chosen. One is treated with the drug, the other in an identical way except that the drug is absent. If the first patient improves, and the second does not, we can conclude that the drug caused the improvement, *without the application of a statistical analysis*. The essence of this method is that the patients should be identical, and also that the *only* difference between their treatments should be the presence or absence of the drug in question. This is impossible to achieve in practice and hence our technique has to be modified in the following way.

We choose not two identical patients, but two groups of patients. This is usually carried out by dividing a larger group into two by a random selection procedure. One of the groups is then treated with the drug, and the other is given the same treatment, but in this case the drug is absent. Next we apply statistical analysis to the difference between the final status of the two groups.

It is important to realize the function of the statistical analysis in a trial of this type, and this can best be done by noting the factors which could conceivably have contributed to the difference in status at the end of the experiment. There are three factors. The first, of course, is the presence or absence of the drug. The second is the possibility that the two groups of patients differed in their ability to respond to the drug, while the third is the possibility that the two groups of patients received different treatment over and above the presence or absence of the drug. The second and third factors are obviously error factors and are referred to by Lindquist (4) as Type I and Type II errors respectively. Type II errors include such factors as doctors' and nurses' expectations, the influence of relatives, and so on. Differences in final status can therefore be attributed to the drug, or to error, and it is most important to be able to determine the total amount of this error before we can tell whether there is any difference left between the two groups which we could attribute to the drug itself.

The statistical analysis which is applied to trials of this type will enable us to estimate the Type I error *only*. It will *not* tell us how much Type II error has contributed to the difference in final status. To take a practical example, suppose there is a 20 per cent. difference in relapse rate between two groups of patients and we wish to know whether this difference is statistically acceptable. The statistical analysis may indicate that a 10 per cent. difference in relapse rate could be expected from errors of the Type I variety. We could therefore conclude that, as the actual difference is twice as large as this, it is statistically

acceptable at about the 5 per cent. level of significance, and would therefore interpret the results as indicating that the drug was beneficial. We have entirely ignored the fact, however, that a further 10 per cent. difference in relapse rates might be attributable to Type II errors which, if added to the 10 per cent. difference due to Type I error, would account *entirely* for our observed 20 per cent. difference. In this case the conclusion which follows is that the difference in relapse rates between the two groups is *not* statistically acceptable.

Of course, the obvious precaution to be taken is to eliminate the Type II errors entirely in designing our experiment, and if we can be satisfied that they are completely eliminated, then our statistical analysis may be of benefit. It has been our experience, however, that it is difficult, if not impossible, to eliminate these errors for reasons we pointed out earlier.

In any case, even if we could eliminate them we would still be left with a fundamental problem. A point which is frequently ignored is that the very first step in setting up a controlled trial should be to collect two samples of patients in such a way that they are both representative of the population about which generalizations are to be established. Groups of patients for clinical trials are rarely selected in this way, and the more usual procedure is to divide a group of patients in a particular hospital at a particular time into two groups by a random selection procedure. This is *not* the same as selecting two groups at random from a definite population. In all statistical analyses, conclusions refer to the population from which the sample was drawn. In other words from the behaviour of the sample we generalize to the behaviour of the total population.

In some cases the fact that we do not work with strictly random samples may not be an important drawback, but in psychiatry, where there are no hard and fast rules for diagnosis, the drawback is a serious one. It means for instance, that a clinical trial of a new drug for schizophrenia which is carried out in a single hospital can tell us very little about the effectiveness of the drug in another hospital where the diagnosis of schizophrenia may have a different basis. In addition, even if there were complete agreement over diagnosis, the patients remaining in a hospital with an active discharge policy would differ from those in a hospital with a custodial care policy. Worse still, as clinical trials of this sort are usually carried out in a single ward from which two groups of patients are formed on a random basis, we are not even able to generalize over the population of patients in the same hospital.

It follows from this argument that the statistical approach as it is usually applied has added little to the scientific approach outlined above. By randomizing the patients of one ward into two groups we have probably achieved some measure of success in equating the two groups on their ability to profit by the treatment under trial, though the degree of success is usually unknown. We have no justification in regarding them as random samples of a population and unless this is so we have no justification in applying statistical analysis at all. Even if we had, the statistical analysis would never give us an estimate of the Type II errors contributing to the final difference.

If the results of clinical trials in psychiatry are to be applicable to all hospitals and all patients in the country, then it will be necessary to organize a national research project. If the problem is to evaluate a new treatment for patients with schizophrenia, the experiment should be carried out using the total schizophrenic population of hospitals selected on a random basis. The patients from each hospital should then be divided into two groups on a random or matching basis. One group should be given the new therapy and the other

a form of treatment as nearly matching the new in its exterior presentation as possible. The same doctor and nursing team should be concerned with both groups, and each should receive identical amounts of doctor and nursing time.

If the total groups in the hospitals concerned were too large, as is probable with most psychiatric illnesses, a random selection or representative sample from each should be obtained. It would be an advantage if the group was of such size that the treatment project could be carried out on one ward.

The application of analysis of variance to the results of such a national trial would enable generalizations to be made to cover all the hospitals in the country. Furthermore, it would allow an examination of the statistical significances of the differences in response to treatment exhibited by the various hospitals in the sample. It would provide clues to the types of patient likely to respond and the type of environment which would enable patients to improve. Hospitals not in the sample would be able to consider which of the hospitals in the experiment they most closely resembled, in order to decide how their own patients would probably respond to the new treatment.

It could be argued that such an elaborate trial is quite unnecessary, as the various manufacturers presenting new products already obtain the co-operation of a large number of different hospitals. There is an obvious fallacy in assuming that the results from hospitals interested in trials of new treatments will be the same as those with less interest, nor are they a random sample, which invalidates a statistical assessment.

There are very serious difficulties in organizing a national trial. Full approval of the proposed new treatment would have to be obtained in advance from all the hospitals and doctors. This would seem to be most unlikely under present conditions. Even if such a national trial became probable, we must point out that it has one serious defect, which would limit its value. This is inherent in the nature of psychiatric practice. Each hospital develops its own unique human atmosphere, determined by the medical and nursing staff. Patients react to this atmosphere and the extent of the success or failure of new treatment regimes will be determined by it. Because of this, each hospital must conduct its own research programme, quite apart from the results of any national trial (which might give useful guidance), or the present haphazard trials.

Most trials using placebos or variations on the double-blind technique are trying to eradicate the influence of staff attitudes. Although, in theory, this should give more information about the effects of the treatment alone, in practice no psychiatric treatment is used in such a manner. We have already noted that so-called "blind" trials fail to deceive the nurses. Apart from this, these trials contain a major fallacy insofar as they are intended to be applied to ordinary clinical practice. We do not want to know the effect of a new treatment used in an atmosphere of uncertainty, but its effects in a normal atmosphere of therapeutic hope.

We therefore suggest that the nursing and medical staff should have full knowledge of the trial in advance. A record should be made of their instructions and expectations before, during and after the trial. We should consider using our ingenuity in devising methods of recording human expectations and hopes rather than in developing techniques for deception. Apart from other assessments we should always record patients' illnesses in terms of their relationship to each other and to the nursing staff. As the trial progressed we would record changes in patients' attitudes to the nurses and vice versa. At the end of the trial the mean scores would be compared and experiments should be repeated on another ward with another nursing team. If this confirmed the findings on

the first ward, it would be highly probable that the results were reliable. If there were differences in the results, the experiment had not been accurately duplicated. The differences may of course be in the patients themselves, nursing attitudes or other variables. It should be noted that statistical analysis is not applied to this type of trial.

In conclusion we must point out that psychiatric patients present many special problems for those conducting clinical trials. In psychiatric illness, the human environment is of vital importance. No surgeon would consider comparing the results of operations, some of which were conducted under modern aseptic conditions, and others in a country cottage. Similarly, psychiatrists cannot compare results of clinical trials in differing human environments.

Reports on clinical trials are of limited value unless further information is given not only about the design of the trial but also of the total physical and human environment in which it takes place.

Lastly, the statistician should not be expected to apply his special techniques to a trial in which the design and method do not justify such action.

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AN INVESTIGATION AND SURVEY OF 27 CASES OF AKINESIS WITH MUTISM (STUPOR)

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A PATIENT in a state of stupor presents one of the most remarkable phenomena seen in medicine. The term "stupor" itself is in widespread use in general medicine and usually refers to partial or near coma. Its precise use in psychiatric practice implies a condition of immobility and muteness without loss of consciousness or organic paralysis. The term "akinetic mutism" is sometimes used to describe such states, particularly by neurologists. The actual clinical appearance or syndrome is too well known to warrant a detailed description. Essentially, for the purposes of this paper, it is equated with akinesis and mutism.

The classical description of stupor was written by August Hoch in 1921. His main contention was that when Kraepelin (1909) included stupor states in his large group of dementia praecox patients, he implied that these states could hardly be thought to be recoverable. Hoch's belief was that there were essentially two types of stupor reaction—benign and malignant, defining benign stupor as a recoverable psychosis. (In this connection it is of interest that Rachlin (1935) found that 11 out of 13 cases diagnosed as benign stupor by Hoch were subsequently followed up and adjudged to be schizophrenic.)

Because of more hopeful nursing attitudes and more personal treatment, these states are now not so frequently seen as they used to be. The present study consisted of 27 such patients seen for the first time and as first admissions, manifesting this striking picture. To anticipate the final diagnostic conclusion, of these 27, 12 were depressive reactions (11 F., 1 M.): 9 were schizophrenic (8 F., 1 M.): 2 (F.) were epileptics and 4 (1 F., 3 M.) showed mixed neurotic states with both depressive and hysterical features.

The 27 cases were assessed neurologically, psychologically and biochemically. No state was called "stupor" for this study unless it basically showed both immobility and mutism with no sleepiness or loss of consciousness. Thus "near-stupors", or patients showing general diminution of all activities but yet not the complete immobility as required above, were not considered. In many of the cases, though not in all, no previous history was available at the initial examination.

RESULTS

A. NEUROLOGICAL EXAMINATION

A careful and comprehensive neurological examination revealed no abnormalities or anomalies in any of the cases.

B. PSYCHOLOGICAL ASSESSMENT

Weinstein *et al.* (1955) drew attention to the occurrence of withdrawal and muteness, inattention and pain asymbolia, in 23 patients with brain disease. Amongst many other factors, these clinical phenomena were considered from

the point of view of pre-morbid personality traits. They found that the pre-morbid background was characterized by the habitual use of withdrawal and avoidance in stressful situations, and a high valuation as modes of communication of silence, suffering and tragic ludicrous behaviour.

An attempt was made to formulate some idea of the pre-illness personality type of our patients. In some cases, owing to lack of corroboration, this was not possible, but a reasonably exhaustive survey was made of 18 of these patients. However, only 3 of the depressive and 2 of the catatonics could be described as showing similar traits to those enumerated by Weinstein *et al.*

Assessment of personality included a psycho-dynamic profile as described by Gressell (1949) and was derived from both patient and relative sources. Specific inquiry was also made into the existence of traits as mentioned above. Some of the catatonics had undoubted pre-morbid schizoid personalities; it may therefore be objected that the possession of such a personality by itself implies "a habitual use of withdrawal . . . and a high valuation as modes of communication of silence . . ." etc. . . . but in only the two cases as described was this phenomenon a phasic and reactive occurrence, fairly definitely related to periods of stress and emotional disturbance.

On the whole, therefore, the pre-morbid personality in these patients was not a consistent or repetitive one showing definite traits which might suggest a regressive phenomenon under stress to basic patterns of behaviour and conduct.

C. BIOCHEMICAL AND ENDOCRINOLOGICAL INVESTIGATIONS

1. *Response to Sodium Amytal and Methedrine*

As a routine investigation in all our cases of stupor, we used a 20 per cent. solution of sodium amytal and subsequently a solution containing 20 mg. of methylamphetamine (Methedrine).

After 2 to 4 c.c. of a 20 per cent. solution of sodium amytal, we obtained a variety of responses. In only two of the catatonic patients did the drug have a "normalizing" effect; Blackwenn (1930). In all the others it produced movement and speech but the content of the speech was clearly schizophrenic in type, Kant (1943). Used in this way, the drug was of great value in the depressive and hysterical states, enabling rapport to be obtained and the content of the conversation noted. A typical depressive thought content often is of great help in a problem of diagnosis. Even in the mixed states it was found that effective disinhibition could be obtained. In these not only was the depressive component obvious, but also associated hysterical features were observed.

In no case was there seen such a dramatic response when I.V. methedrine was used. Certainly nothing resembling a state of normality could be seen, but in the remainder of the catatonic patients some activity and speech resulted. In the depressive stupors some elevation of mood was occasionally observed but again this drug had nothing like the capacity for disinhibition in these cases as seen with sodium amytal. This was in keeping with Hoch *et al.* (1952) who found similar results with amytal and pervitin in different types of schizophrenic reaction.

In general, our results were consistent with well-established results, but it seemed impossible to forecast the catatonics who could be "normalized", as distinct from those whose body movements and speech were disinhibited only, by sodium amytal.

2. Autonomic Function

In 1948, Funkenstein, Greenblatt and Solomon published a study of the effects of adrenergic and cholinergic stimulation as a test of the autonomic nervous system in psychiatric patients. They used adrenaline intravenously and mecholyl intramuscularly in patients of different diagnostic categories and reported seven different response patterns. None of these autonomic responses was found to be specific for any diagnostic group, but patients in two of their groups responded more favourably to electroplexy than those who fell into other groups. Further studies by this group of workers produced further evidence that psychiatric changes of clinical proportions are frequently accompanied by change in autonomic activity.

The whole of the 27 patients were studied by the mecholyl test. The test was made on the fasting patient lying in the supine position and made as relaxed as possible; then the blood pressure was taken once per minute for eight minutes. Ten mg. of mecholyl in 1 c.c. of water was then injected into the opposite buttock as deep into the muscles as possible. Subsequently, the systolic blood pressure was taken and recorded every half-minute for 6 minutes after the injection and then every minute for an additional 20 minutes.

Thirteen out of the 27 patients (including the two epileptics) failed to show any significant drop in blood pressure. This is in accord with the findings of Simon *et al.* (1953) and substantiates their view that such a high number of failures makes the test somewhat unreliable as an indicator of autonomic function.

Fourteen patients showed some drop in systolic blood pressure which could be considered significant (over 7 m. of Hg). Of these, 11 were depressives, 2 a mixture of depressive and hysterical features, and one a catatonic. All of these subsequently reacted well to electroplexy, but so also did 8 out of the 13 who showed no response to mecholyl. This pattern of reaction in these stuporose states seems to confirm the results of other workers in schizophrenics (Silverstein *et al.*, 1956) and psychoneurotics (Simon *et al.*, 1953).

No particular pattern of reaction could, therefore, be elicited in this group of mute patients; rather was there a diversity of reactions, including none at all, which seemed to suggest no particular autonomic system involvement in this group of patients. In the differential diagnosis of stuporose cases, such autonomic tests appear to have little value.

3. Liver Function Tests

A battery of liver tests was performed and, following Kelsall *et al.* (1947) a combination of plasma-bilirubin, alkaline phosphates and protein estimations was considered as informative as any other. In addition, Macagen's thymol turbidity test was used, and Ehrlich's aldehyde reaction for urobilin and urobilinogen in urine was also performed.

No abnormality was detected in any of these 27 cases of stupor. Table I shows the mean value of these cases.

TABLE I

	Plasma Bilirubin	Plasma Phosphates	Serum Albumen	Serum Globulin	Thymo Turbidity
Mean of 27 cases	0.49 mg./100 ml.	5.2 units	4.32 g./ 100 ml.	2.5 g./ 100 ml.	1 unit

4. *Endocrine Findings*

Here a combined clinical and laboratory examination was made. In women, menstrual history and development of secondary sex characteristics were noted and an estimation of a 24-hour specimen of urine was made for total ketosteroids, Dorfman (1948). Adrenal activity was measured by the method of Reiss *et al.* (1951) and an assessment of thyroid activity by the radio-iodine method of Haigh *et al.* (1954).

Of the 12 depressive stupors, 4 were menopausal and their menses had ceased several months to two years before. All had normal pre-menopausal menstrual histories. Two female depressives in the group showed slight moustache formation, otherwise their secondary sex characteristics were normal.

In no cases were abnormal ketosteroid amounts demonstrated and all adrenal responses were considered positive. Likewise, thyroid activity in every case was normal.

5. *Metabolic Functions*

Plasma cholesterol, serum calcium, serum phosphate and alkaline phosphate assessments were all carried out by the method of King (1951). In addition, it was possible to perform a glucose tolerance test on 12 of these cases in stupor—7 depressives and 5 catatonics.

According to the normal values of these constituents (King 1951) no single abnormality was found. All were within normal limits.

Two cases showed mild types of diabetic curves, but on repetition these had become normal. No explanation was subsequently found for this but it was generally thought to have a technical and laboratory origin.

D. EEG RECORDINGS

These were carried out on all 27 patients. The two epileptics showed unequivocal evidence of a pattern of abnormal activity diagnostic of epilepsy. The great majority, however, during the clinical phase of stupor, were either within normal limits or showed some slowing. In three cases, all normal electrical activity was replaced by 4–7/second slow waves. In the rest, however, only sporadic theta activity was seen. No delta waves or focal asymmetry was seen in any record.

DISCUSSION

It can be fairly said that a reasonably exhaustive neurological and biochemical survey of these cases of clinical stupor has not revealed any persistent or pathological findings of any significance. De Jong (in 1930) (1956) after reviewing the many methods available for producing experimental catatonia in animals, came to the conclusion that the syndrome could be regarded as a "general reaction form of the central nervous system". Electro-encephalography was of little help in the elucidation of these cases of stupor, although of course, surface electrodes only were used. In this connection the report of thalamic activity in stupor described by Williams and Parsons-Smith (1951) is of interest. They came across rhythmic disturbances in the optic thalamus of a man who was akinetic and mute. Hill, D. (1950) reported EEG anomalies in catatonia when the symptoms are related to a gross brain pathology, i.e. abnormalities related to particular diseases and sites of lesion. More in keeping with our

cases was the observation of diffuse low voltage irregular delta activity during phases of catatonic schizophrenia, Walter, W. Grey (1942).

Straus and Griffith (1955) tested the responsiveness of catatonic patients to various situations by photographic recording and came to the conclusion that the motor system is not disturbed in the catatonic. In their cases also there was nothing abnormal found in the neurological and EEG examinations. They propose that catatonic symptoms are manifestations of disturbance of action rather than an impairment of mobility.

The pharmacological production of stupor (De Jong, 1956) and the normalization of stupor by sodium amytal (Blackwenn, 1930) seem at times to confirm the impression that catatonic symptoms are directly related to disturbances of certain motor elements or segments of the nervous system.

The answer would seem partly to be in what is defined as "stupor". The word is used in practice to describe all sorts of conditions, ranging from slight refusal to speak in a varying continuum to states of coma and unconsciousness. For the purposes of this study, a state of stupor was defined and recognized when it fulfilled the criteria laid down (*vide supra*). In essence it can be equated with the state of affairs known to neurologists as akinetic mutism. Under this definition, a survey of clinical work and of the literature suggests three main aetiological groups, and a classification of conditions in which the state of stupor can be seen, as follows:

A. Psychogenic

1. Depressive
2. Catatonic
3. Hysterical
4. Maniacal
5. "Shock" stupor

B. Toxic-organic

1. Post-traumatic
2. Encephalitis lethargica
3. G.P.I.
4. Tumour of frontal lobe or corpus callosum
5. Epilepsy, equivalent or post-ictal
6. Simulation by drugs—morphine, mescaline, etc.

C. Psychogenic and Toxic-organic

1. Combination of A and B.

In psychiatric practice, depressive and catatonic stupors are by far the most common. On several occasions it was simply not possible by clinical, objective examination to differentiate between the two, and although the majority of the depressive stupors, as seen, never showed the complete immobility and failure to respond to external stimuli as catatonics (Lewis, A. J., 1934), nevertheless this is certainly not universally true. Of course, in clinical practice, it would indeed be unfortunate to try and diagnose any of these cases without an antecedent history, which by itself often suggests the correct solution.

Hysterical stuporose states are uncommon, but have been described by Neustatter (1949) and Garmany (1955). In this series, not one could be described as hysterical, although in two of the depressive cases it was believed that

hysterical components were active, causing the stupor to be unduly prolonged and unduly resistant to any nursing attention. In both these cases, there was a definite gain to the patient in being unable to communicate with the outside world at that particular time. In each case there had been a period of long-continued stress and then a short period of overwhelming strain during which each became ill.

Clinical states of akinesia and mutism can occur in a wide and varied number of syndromes. Similar pictures can be seen in people, for example fakirs, who presumably are in full conscious control of their actions. Some of these people are of course, schizophrenics or mental defectives, but by no means all. It is also well known that training and drill are able to produce states of immobility and mutism, for example in some Guard units, for hours at a time. On the other hand, Weinstein *et al.* (1955) point out that mute akinetic reactions are common in stressful situations. Is the mechanism in these cases explicable by the protective cortical inhibition of Pavlov, described by Sargant (1951), when such clinical syndromes arise, protecting the patient from intolerable stress, real or imagined?

Nielson (1953) has also produced theories of causation of stupor in organic states. On the basis of previous work he postulates that lesions around the periaqueductal grey matter in animals produce a state of akinesia and mutism. Nielson suggested the mechanism whereby the pathological lesions in Wernicke's encephalopathy could be correlated with symptoms, subsuming the symptomatology of the condition into (a) excitement and psychotic behaviour and thought, (b) akinetic mutism, and (c) sopor to coma to death. He also pointed out that it is known that there are projections of mammillary bodies and anterior thalamic nuclei to the frontal lobes as well as to the anterior cingulate gyrus. A lesion of this area, he thinks, also produces akinetic mutism by removing impulses destined for the anterior cingulate gyrus.

Denis Williams (1954) referred to work of Magoun (1952) on the effects of interruption of a small area of the brain stem near the aqueduct. This produces electrical changes in the brain consisting in episodic rhythms like those in the sleeping animal. The animal becomes inactive and apathetic, assuming a state resembling stupor in man. Williams described in this paper a state of stupor—"an odd condition, which is so well known to psychiatrists and ignored by others"—in a man who later died. The brain was found to contain a single small secondary deposit of a bronchogenic carcinoma in the midline of the mid-brain, without hydrocephalus and without any other secondary deposit in the brain or elsewhere. He saw the picture as the modification of "this intelligent professional man's response to his environment . . . and ultimately disintegrated by a tiny lesion of the brain stem". He further felt that such a case presented considerable problems to those who look entirely to the cerebral hemisphere for an explanation of changes in purposive behaviour.

There can clearly be no unifying theory of the pathophysiological or psychological causation of stuporous states. They are seen in many and varied organic states and classical cases have been described subsequent to small selective brain stem lesions. Some cases suggest a physiological explanation on Pavlovian lines; others a motivated mode of adaptation to stress without defects or anomalies in the perceptual or motor components.

Certainly the cases described here, frankly psychiatric in selection, showed no demonstrable neurological or biochemical anomalies. As Straus *et al.* (1955) suggested, they resembled more "perseveration of attitude . . . perhaps as an incapacity to initiate any change".

The pre-morbid personality as described in similar states by Weinstein *et al.* could not in many cases help in the final elucidation of the mechanism; but certainly it was an appealing hypothesis to conceive of a regression to a more fundamental attitude of mind and body in periods of great stress.

The varying conditions under which this condition occurs suggest strongly the activation of a preformed cerebral function seen more particularly in some susceptible people, by varying psychological and organic states. This conception appears to be in harmony to some extent with Kirby's (1913), and certainly in keeping with De Jong (1930) who conceived the state as a C.N.S. general reaction to many stimuli.

It is also clear that none of these cases corresponded to the rare periodic and phasic catatonics showing nitrogen retention or compensatory excretion described by Gjessing (1947).

SUMMARY

1. A survey of 27 cases of stupor is given. There were no organic cases. The two common groups were depressive (12) and catatonic (9).
2. In these psychogenic cases of stupor, no anomalous neurological, EEG, autonomic, or biochemical investigations were found.
3. A review of the syndromes of stupor is made and the differing theories entertained to suggest its causation.

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EFFECTS OF CERTAIN VITAMINS AND HISTAMINES ON THE LSD PSYCHOSIS

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STOLL, in 1947, reported on the effects of LSD-25, an ergot alkaloid which can produce striking mental changes in normal persons, when given in microgram quantities. Since this original report, many papers and provocative ideas on the subject have appeared.

Because of certain similarities between schizophrenia and the effects of LSD-25, some workers have postulated that schizophrenia is due to a biochemical abnormality. This has led to the hope that by discovering the biochemical mechanisms by which LSD operates, we may have the key to the fundamental chemical disorder in schizophrenia. While the authors are much less optimistic about finding the key to schizophrenia in LSD studies, we do feel that some insight into central nervous system physiochemistry can be gained using LSD as a tool.

Among compounds reported to be effective in antagonizing the LSD-25 reaction are the phenothiazines (Hoch, 1955; Isbell and Logan, 1957). Contradictory reports exist as to the effectiveness of azacyclonol (Hoch, 1955; Isbell and Logan, 1957; Fabing, 1955), sodium succinate and sodium glutamate (Hoff and Arnold, 1954; Hoch, 1956). Agnew and Hoffer (1955) reported that nicotinic acid, administered at the height of LSD-25 psychosis had a "markedly normalizing effect". Substances closely related to LSD-25, i.e. 2-Brom-LSD (BOL-148) and 1-methyl-LSD (MLD-41), have been reported to block the effects of LSD-25 if given prior to LSD-25 administration in adequate amounts (Ginze and Mayer-Gross, 1956; Abramson *et al.*, 1958). Antagonism does not occur if they are administered at the height of the LSD-25 psychosis (Ginze and Mayer-Gross, 1956).

The purpose of this report is to present our studies with certain vitamins essential in brain metabolism as antidotes to the LSD-25 induced psychosis. These studies, which are of an empirical nature, were designed chiefly to test the hypothesis that LSD may act by interfering with the normal actions of one of these vitamins in the brain. We made the supposition that if this were so, a sudden oversupply of the vitamin might be sufficient to overcome the LSD effects.

METHODS

LSD-25, 1 mcg./kg. was administered orally to each of 24 normal male volunteers on two occasions. Antidotes were administered intravenously one and three-quarter hours after LSD-25. Each subject received one of the antidotes under study one week, and a control injection of saline placebo the other week. The subjects were given an understanding of the nature of the experiment, and were told that we were testing antidotes to a drug which modified behaviour. They were not told what to expect from each antidote. The time at which the antidote was given was selected because our previous experience indicated that at this time the majority of subjects would be just approaching the height of the reaction, and attrition of LSD-25 effects would be avoided. Evaluation was by means of a standard interview (Abramson *et al.*, 1958), and by psychological testing. The subjects were interviewed before LSD-25, and just before and after antidote administration. The tests used were the Gorham Proverbs Test (concrete vs. abstract thinking) and the Digit Span Test (memory for numbers repeated forward and backward). Our previous experience with these tests has revealed significant impairment following LSD-25 ingestion (Silverstein and Klee, 1958).

Following these studies nicotinamide was administered orally to four subjects one hour after being given LSD-25, 1 mcg./kg. In addition four more volunteers were premedicated with pyridoxine 100 mg., q.d., i.m. for three days and then administered 1 mcg./kg. LSD-25 (Table I).

TABLE I

Summary of Antidotes Administered and Subjective Evaluation of Improvement of LSD Reaction

Antidote	Route	Dose	No. Subjects	Temporary* Improvement	Lasting Improvement
Saline ..	i.v.	2 c.c.	20	3†	0
Nicotinic acid ..	i.v.	200 mg.	8	3	3†
Histamine ..	i.v.	0.1 mg.	4	2	0
Thiamine ..	i.v.	50 mg.	4	0	0
Pyridoxine ..	i.v.	100 mg.	4	1	0
Nicotinamide ..	oral	200 mg.	4	0	0
Pyridoxine ..	i.m.	100 mg. × 3 days	4	0	0

* Temporary improvement is defined as improvement reported in the 20-minute post-antidote interview only.

† Subjects reporting improvement from nicotinic acid also reported temporary improvement from saline.

“ANTIDOTAL” SUBSTANCES EMPLOYED

(a) *Nicotinic Acid*

Diphosphopyridine nucleotide (DPN) and triphosphopyridine nucleotide (TPN), coenzymes which function in cellular oxidation-reduction systems, both contain nicotinamide. Nicotinic acid has been used in the treatment of psychotic states either related or unrelated to nicotinic acid deficiency and pellagra. Since we were aware of no reports of its use with LSD other than that already mentioned (Agnew and Hoffer, 1955), we believed that further study of the effects of this compound on the LSD reaction was indicated, especially in view of the recent work of Axelrod *et al.* (1957) demonstrating *in vitro* that TPN was involved in the oxidation of LSD-25 to 2-oxy-LSD. The dose used was 200 mg., and caused a warm, sometimes “hot” feeling, tingling, and a visible flush pre-

dominantly of the head and neck in all 8 subjects. This reaction lasted from 15 to 30 minutes and was interpreted as being unpleasant by most of the 8 subjects to whom it was administered. Nicotinamide in doses of 200 mg., administered orally had no significant peripheral effects.

(b) *Histamine*

Histamine was used in an attempt to control for the peripheral effects of nicotinic acid (flushing) which tend to complicate the evaluation of any possible central effects of the vitamin. A characteristic reaction was observed when histamine was administered in the dose of 0.1 mg. intravenously in 4 subjects. This consisted of a mild transient blood pressure fall, a flush and a feeling of warmth, and a "pounding" headache which lasted approximately 5 minutes.

(c) *Pyridoxine*

The coenzyme pyridoxal phosphate is part of the enzyme system involved in the transamination of glutamic acid with oxalo-acetic acid, yielding aspartate and alpha ketoglutarate; and also in the decarboxylation of glutamic acid. After i.v. administration of 100 mg. to 4 subjects, no symptoms or signs were noted from the injection.

(d) *Thiamine*

Thiamine hydrochloride was used because of its occurrence in nervous tissue as co-carboxylase, or thiamine pyrophosphate. Thiamine deficiency is known to produce effects which predominantly involve the central nervous system. Except for a peculiar taste, no effects were noted from intravenous administration of 50 mg. of thiamine in the four volunteers given this medication.

RESULTS

(i) EFFECTS OF LSD-25

The subjects in this study experienced the usual effects of 1 mcg./kg. of LSD-25. These included visual and somesthetic perceptual distortions, elementary visual hallucinations, impaired concentration, tension, and various changes in mood and affect. Loss of time sense and feelings of depersonalization and unreality were also common. No striking delusional ideation occurred in any of the subjects in this group.

(ii) ANTIDOTAL EFFECTS

(a) *Effects of Saline Placebo*

All but 3 of 20 subjects administered saline placebo noted "no change" or "worse". These 3 subjects noted improvement subjectively only at the 20-minute post-antidote interview. These three subjects all reported improvement of LSD-25 symptoms when nicotinic acid was used as the antidotal agent. No change in specific symptoms were noted in two of the three subjects. The third subject noted some improvement in concentration and a feeling of lightness 20 minutes afterward, but 60 minutes later stated that he did not think the antidote really helped him.

(b) *Nicotinic Acid*

Six of the 8 subjects receiving nicotinic acid as an antidotal substance thought this drug was of benefit 20 minutes following i.v. administration.

After 60 minutes and on the following day, however, only 3 subjects thought this substance to be of more than temporary benefit. These, incidentally, were the same three subjects who reported improvement from saline. One of the three reported he felt more active and his mood changed from depression to euphoria. He also noted that his concentration was improved. The other two subjects who reported improvement noted more contact with reality, less numbness and tingling and reported feeling "more relaxed". One of these two subjects also felt that his ability to concentrate was improved.

(c) *Histamine Phosphate*

Four subjects were administered histamine phosphate, 0.1 mg. intravenously. Two of the 4 subjects thought they could concentrate better, but this improvement was transient.

(d) *Thiamine Hydrochloride*

No improvement was noted in the LSD-25 reaction in any of the 4 subjects given thiamine as an antidote.

(e) *Pyridoxine*

One of the four subjects administered pyridoxine noted improvement in concentration, but follow-up interviews again revealed the benefit from the antidote to be transient. No amelioration of LSD-25 symptoms occurred in any of the four volunteers premedicated with pyridoxine.

(f) *Nicotinamide*

No improvement was noted in any of the four subjects given nicotinamide orally, 200 mg., following LSD-25 administration.

(iii) PSYCHOLOGIC TESTING

The use of nicotinic acid as an antidote compared to saline did not improve test scores significantly. Some test scores improved after the other antidotes and after saline placebo, but in no cases were these changes significant.

DISCUSSION

None of the substances used in this study produced unequivocal improvement. Nicotinic acid did produce subjective improvement in 3 out of 8 subjects, but these were subjects who also reported some improvement from saline. Although nicotinic acid cannot be completely excluded as an LSD antagonist, considerable doubt is cast upon its efficacy.

The present authors prefer a different explanation for the occasional antidotal effect of nicotinic acid. Nicotinic acid in producing a flush and a feeling of warmth restores some of the body feeling which the LSD-25 subject has lost, and may be interpreted by the subject as improvement. In support of this reasoning is the failure of nicotinamide or nicotinic acid to block or modify effects of LSD-25 when given prior to or at the time of administration of LSD-25 (Agnew and Hoffer, 1955; Miller *et al.*, 1957). Furthermore, nicotinamide given one hour after LSD-25 did not influence the LSD-25 reaction. This is a compound which is utilized in the same way as nicotinic acid but lacks its side-effects. These studies would indicate that the side-effects rather than any true antagonism are responsible for the antidotal effects observed. Temporary improvement also

occurred in 2 of 4 subjects receiving histamine. Yamada and Takumi (1956) also noted transient improvement in patients given LSD-25 and antidoted with a histamine infusion. This "improvement" can also be explained on the basis of the peripheral symptoms.

Additional factors complicating the evaluation of a potential antidote are: Suggestibility of the subject, and the spontaneous wave-like fluctuations in the subjective intensity of LSD effects. Objective measures are of limited value when changes are small and subtle.

A question which should be considered is whether prolonged administration of any of these vitamins in large doses preceding LSD-25, would have produced different results. This was tested with pyridoxine (with no effect) but not with any of the other vitamins. This question could be answered only by further studies.

We wish to emphasize chiefly the potential value of the type of approach used in these studies. When the pharmacology of the potential antidote is known, then even negative results can be of value in narrowing down the potential sphere of action of LSD. In an ideal study, however, the potential antidotes to be tested should not be selected on a trial and error basis. It is to be hoped that as more information is gained from *in vitro* studies, it will provide us with more clues to use in choosing potential antidotes. Further studies (following such leads) are in progress in this department.

SUMMARY

A total of 20 subjects were administered certain vitamins involved in brain metabolism or histamine intravenously at the height of their reactions to LSD-25. Saline controls were also run. None of these substances produced consistent beneficial results, either subjectively or objectively. Subjectively, only nicotinic acid produced more than temporary benefit, but this was in subjects who also experienced temporary benefit after saline.

Additional studies with nicotinamide following LSD-25 administration and pyridoxine prior to LSD-25 administration, also failed to influence the effects of LSD-25.

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ON THE PROGNOSTIC VALUE OF THE MODIFIED WORD LEARNING TEST IN PSYCHIATRIC PATIENTS OVER 65

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IN a recent paper Walton (3) has described the diagnostic and predictive accuracy of the Modified Word Learning Test (Walton and Black (4)) in relation to psychiatric disorders of the senium. Walton assessed the predictive value of the test in terms of changes in diagnosis over a two-year period. However, as Payne (2) has pointed out, a diagnosis, as such, can only be regarded as a kind of label, of interest not in its own right, but because of its *implications*. These, Payne has argued, are commonly fourfold, being related to (a) aetiology, (b) description, (c) the effects of treatment and (d) prognosis.

Of the 48 psychiatric cases described by Walton, data are provided on 19 cases which permit of a further prognostic evaluation of the test in terms of the outcome of illness. Two broad classes of "Favourable" and "Unfavourable" outcome can be discerned. For example, the statement, "Re-graded voluntary, bright, cheerful and correctly orientated", would count as a favourable outcome, whereas, "Died, cardiovascular degeneration", would, of course, count as unfavourable. If the patients are also classified in terms of test scores (a score of 31 and over being "High", and therefore indicative of a learning deficit, a score of less than 31 being graded "Low") then a fourfold table (Table I) may be constructed.

TABLE I

Test Score							Outcome	
							Favourable	Unfavourable
Low	..	..	..	..	..	..	9	1
High	..	..	..	..	..	..	3	6

The association between test scores and outcome can be assessed by the chi-square test for independence in contingency tables described by Garrett (1). A value of 6.7 is obtained, which, with 1 degree of freedom, is significant at beyond the .01 level. That is, there is a significant relation between test score and outcome.

The possible effect of two other variables which might have influenced this association may also be analysed from the data given in Walton's paper.

(i) *The effect of age:* It might be the case that the difference in outcome could be a function of differences in age. In fact, however, the mean age of the favourable outcome group is 71.6 years and the mean age of the unfavourable outcome group is 71.4 years.

(ii) *The effect of initial diagnosis:* It might be the case that the initial diagnosis, made at the same time as the test was given, could have predicted outcome as well as did the test score. This notion can be tested by constructing

another fourfold table, this time relating outcome to initial diagnosis. Psychiatric usage suggests that an "Organic" diagnosis indicates a poor prognosis, whereas a "Functional" diagnosis gives a better prognosis, at least in terms of the kind of outcome examined. The actual relation is shown in Table II.

TABLE II

Initial Diagnosis	Low High					Outcome	
		..	..	..	..	Favourable	Unfavourable
		..	..	..	..	4	4
		..	..	..	..	6	5

By the chi-square test a value of .025 is obtained which, with 1 degree of freedom, is not significant. That is, there is no evidence, in this instance, of an association between outcome and initial diagnosis.

It may therefore be suggested that the Modified Word Learning Test can provide a prognostic index related to the outcome of illness which may be superior to the predictive value of the "diagnostic labels" used in these cases of psychiatric disorders of the senium.

SUMMARY

A re-analysis of data on a learning test used with elderly psychiatric patients suggests that scores on the test could be used to predict outcome of illness better than did the initial diagnosis.

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ADAPTATION AND CONDITIONING OF THE GALVANIC SKIN RESPONSE IN PSYCHIATRIC PATIENTS

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THERE is a considerable literature dealing with the relation of anxiety to conditioning performance in human subjects. When compared with normal subjects, those with marked anxiety have been observed to show more rapid conditioning and slower extinction of certain responses. Typical observations have been those of Taylor (17) concerning conditioned eyelid responses, and of Welch (20), and Bitterman and Holtzman (3), concerning the galvanic skin response. In contrast, Bindra *et al.* (2) found no difference in the conditioning of salivary responses between anxious and non-anxious subjects.

The work of Franks (4) has thrown doubt on the assumption that anxiety is the major dimension of personality correlated with conditionability. Using the eyelid and galvanic skin responses, Franks has shown that conditionability is related to introversion-extraversion measures, rather than those of neuroticism, and he suggests that "manifest anxiety is related to strong conditionability only to the extent that anxious people are introverted."

A number of these studies have tried to apply Hullian principles to predict the conditioning performance of subjects with greater and lesser degrees of "manifest anxiety". All have tried to correlate this performance with some personality dimension or other. The purpose of the present study was somewhat different: to study the conditionability of subjects with various psychiatric disorders, rather than to correlate it with drive state, or some other intervening variable. Relatively little information has been gathered in this field, but a review

of the relevant literature is presented, leaving out papers dealing with conditioning in subjects suffering from organic brain disease.

Several Russian authors have reported the results of conditioning experiments with small groups of psychiatric patients. Ivanov-Smolensky (7) found that motor conditioned responses (not avoidance responses) were hard to establish and were unstable following conditioning, in a group of 7 manic-depressive depressed patients. Landkof (8), Guk (5), and Mirolyubov (10) found defensive and avoidance responses difficult to condition in small groups of schizophrenic patients.

Bender and Schilder (1) found it hard to establish conditioned avoidance responses in a small group of schizophrenic patients. Using the GSR, Mays (9) found that the conditioning performance of 20 schizophrenic subjects was superior to that of 16 normal subjects in terms of resistance to extinction.

Several observers have reported the conditioning performance of a mixed group of psychiatric patients. Shipley (14) studied 17 schizophrenic, 10 manic depressive, 9 mixed neurotic and 6 normal subjects in a classical conditioning experiment. When acquisition of the conditioned response was compared, the schizophrenic subjects conditioned at a faster rate than the normal, the manic depressive, and the neurotic subjects, in that order. However, when resistance to extinction was compared, the neurotic group was most resistant, with other groups showing no difference from each other. Pfaffman and Schlosberg (12) attempted to condition knee jerk responses in 19 manic depressive, 25 schizophrenic and 20 normal subjects. Only 5 subjects reached a significant level of conditioning, so that it was impossible to infer any differences between the groups. The authors admit that their procedure was vitiated by massing the trials. Taylor and Spence (18) studied a mixed group of 74 subjects suffering from neurosis or personality disorder, and a group of 42 psychotic subjects, of whom 31 were schizophrenic, in a classical conditioning experiment, using the eyelid response. They found that the performance of the psychotic subjects was superior to that of the neurotic at between the .05 and .1 level of confidence, and that there was no statistically reliable difference between the performance of the main group of neurotic subjects and those who had anxiety neurosis, numbering 15. In this investigation, the subjects' performance was assessed by a measure of acquisition and no data about rates of extinction are recorded.

Franks (4) studied 20 dysthymic, 20 hysteric and 20 normal subjects using eyelid and galvanic skin responses to a tone (CS) and an air puff (US). The dysthymic subjects included patients whose chief characteristics, on psychiatric examination, were anxiety, reactive depression or obsessive-compulsive features. The hysteric group included subjects with predominantly hysterical or psychopathic features. Franks found that the conditionability of the dysthymic subjects measured by both acquisition and extinction measures, was significantly greater than that of the hysterics and the normals, while no significant difference separated the latter groups.

Using the galvanic skin response to shock and to tone, Howe (6) investigated conditioning behaviour in 60 hospitalized subjects with anxiety states, 60 hospitalized chronic schizophrenic subjects and 60 normal subjects. Using the magnitude of response during extinction as the measure of strength of conditioning, he found that the subjects with anxiety states showed significantly stronger conditioning than the normal or schizophrenic subjects. There was no significant difference between these latter groups.

Table I summarizes the chief results of the papers reviewed above, with the differences in conditionability presented simply by ranking the groups according

to performance. A rating of 1 in the case of acquisition indicates faster conditioning; a rating of 1 in the case of extinction indicates slower extinction. It can be seen that the only agreed conclusion is that subjects with anxiety neurosis extinguish conditioned responses more slowly than normal subjects. There is no agreement as to whether schizophrenic subjects behave differently in this test situation than normal subjects or those with anxiety neurosis. It seems more than likely that some of the disagreements between investigators reflect differences in diagnostic criteria. For instance, there seems to be a wide gap between American and European conceptions of schizophrenia, and this may account at least in part for the lack of agreement between Spence and Taylor's and Howe's work on the conditioning performance of schizophrenic subjects.

TABLE I

Author	Type of Criterion	Group		Normal	Total in Group
		Schizophrenia	Anxiety Neurosis		
Mays	Extinction	1		2	36
Shipley	Acquisition	1		2	23
	Extinction	1		1	23
Taylor & Spence	Acquisition	1	2		46
Franks	Acquisition		1	2	40
	Extinction				
Howe	Extinction	2	1	2	120

THE PRESENT EXPERIMENT

Subjects

The subjects were 70 in number, comprising 27 patients with manic depressive disease, depressed phase: 18 with schizophrenia; 15 with personality disorders; and 10 with anxiety neurosis. In the group of personality disorders were included cases of personality trait disturbance (5), sociopathic personality (6), chronic alcoholism (3) and drug addiction (1). In the group of anxiety neurosis 3 patients were included who were suffering from obsessive-compulsive neurosis. These 3 patients also had prominent symptoms of anxiety. Thirty-six patients were male, 34 female; the mean age of the subjects was 39, the range from 15 to 72.

Subjects were drawn from five sources. The psychotic patients were drawn from the in-patient services of Renard Hospital, an acute psychiatric unit which is part of the Barnes Hospital Group, and of The Malcolm Bliss Mental Health Center, the psychiatric unit of the St. Louis City Hospital. The remaining patients were drawn from the Washington University Psychiatry Clinic, the Renard out-patient service or the general medical and surgical wards of Barnes Hospital.

In general the diagnostic criteria used were those described in the A.P.A. diagnostic manual. However, a more limited definition of anxiety neurosis was used, based on the following reported symptoms: (a) difficulty in breathing, (b) palpitation and chest pain, (c) dizziness, weakness, shakiness and feeling scared without knowing why, and (d) tiredness and lack of energy. These criteria are described in full by Wheeler *et al.* (21) At the same time a broader definition was used of manic-depressive disease, depressed phase, which included the conditions labelled "involutional psychotic reaction" and "psychotic depressive reaction" in the A.P.A. manual. In most cases we accepted the diagnosis agreed upon by the attending physician and the resident concerned, but each case was

reviewed by at least one of the experimenters. When it was felt to be necessary, the experimenters further examined the patient in order to confirm or revise the diagnosis. Patients with doubtful diagnoses were not used as subjects.

None of the subjects had received any specific treatment (electroplexy, insulin shock, drug, etc.) other than night time sedation or psychotherapy, within a period of a month before the time of the test.

While no particular element of selection entered into the choice of the majority of patients, a marked bias entered into the choice of patients with schizophrenia, namely the necessity for the subject to co-operate in the test by sitting still for a period of 45 minutes. While no proposed subject from any other group was unable to do this, a number of schizophrenic patients could not even be considered for the test or had to be taken out of the experimental situation before the test was finished.

Apparatus

Continuous readings of the skin resistance were being taken by means of a Lafayette Student Galvanometer, the readings being written out, together with stimulus markers, on a polygraph. The stainless steel electrodes were attached to the subject's second and fourth fingers after a thin film of electrode jelly had been spread on the surface of these fingers. The unconditioned stimulus was produced by a Harvard coil connected to a $1\frac{1}{2}$ volt dry-cell battery, and was delivered to the subject through metal electrodes strapped to the subject's ankle. The conditioned stimulus was produced by a Heathkit Audiogenerator and presented to the subject through a pair of service type earphones. An electronic timing device was used to control the time relations of the stimuli in each trial.

The conditioned stimulus was a 500 c.p.s. tone, whose intensity was about 65 decibels above the normal hearing threshold for this frequency; it was presented for 4 seconds. The unconditioned stimulus was a shock of about 46 volts lasting for one second, and immediately followed the end of the conditioned stimulus in the paired trials.

Procedure

The subject sat alone in an air-conditioned room, observed through a one-way vision window by the experimenters. The experiment began shortly after the subject had been connected to the apparatus and had been given a simple explanation of what was to happen. The actual conditioning procedure fell into three phases. In the first phase (adaption period), the subject was presented with the conditioned stimulus alone until either he failed to give a detectable GSR on three successive trials, or thirty trials had been given. In the second phase, (conditioning period), the conditioned and the unconditioned stimuli were presented paired for eleven trials. In the last phase (extinction period), the conditioned stimulus was presented alone for fifteen trials. During each phase the interval between trials followed a schedule in which the time intervals varied randomly between 160 and 30 seconds. The phases followed each other without pause, and the whole experiment lasted about 45 minutes.

Handling the data

The recorded GSR were classed as either orienting responses (unconditioned responses to the tone), responses to shock, or responses anticipating shock. Since the latency of response to either of the stimuli varied only within

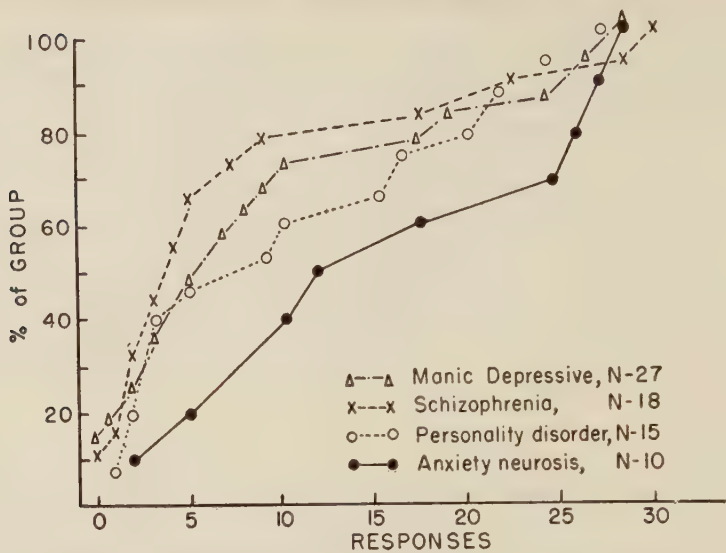


FIG. 1.—Cumulative response curves of orienting responses.

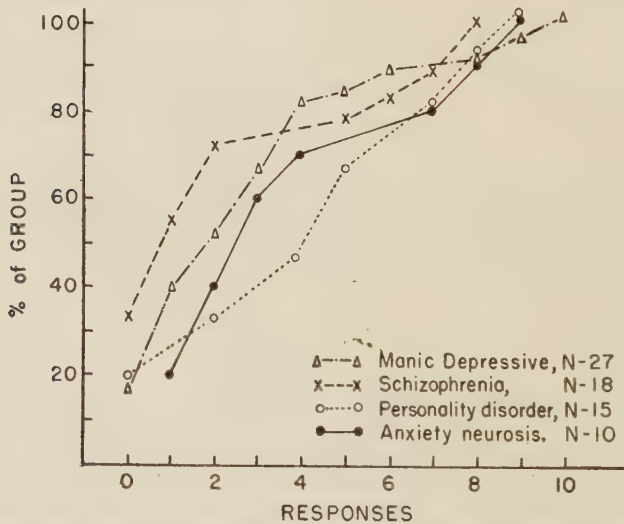


FIG. 2.—Cumulative response curves of anticipatory responses in the conditioning period.

narrow limits (1.0 second at the most) for any one patient, it was used to determine to which class a response belonged. In this way, a response beginning about 1.5 seconds after the onset of the conditioned stimulus was classed as an orienting response; a response to shock was one which began about 1.5 seconds after the onset of the unconditioned stimulus; and a response beginning later than 2.5 seconds after the onset of the conditioned stimulus, but earlier than 1.0 second after the onset of the unconditioned stimulus was classed as a response anticipating shock.

We did not attempt any measurement of the size of responses. Our report deals only with the presence or absence of detectable deflections (responses) in the record, which were related to the stimuli.

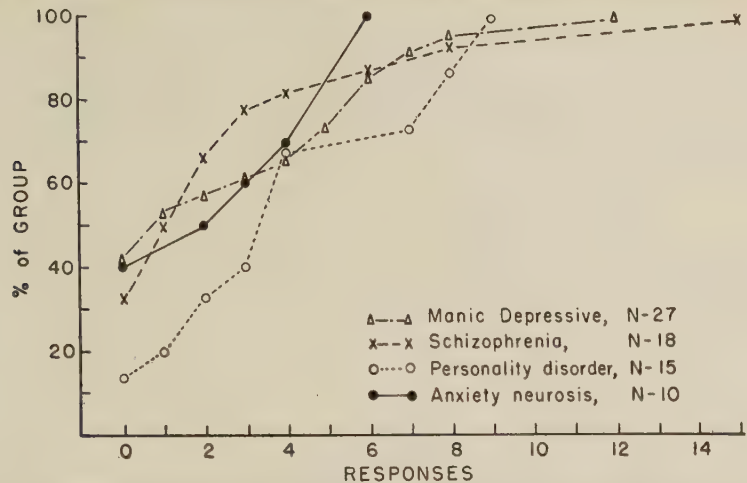


FIG. 3.—Cumulative response curves of anticipatory responses in the extinction period.

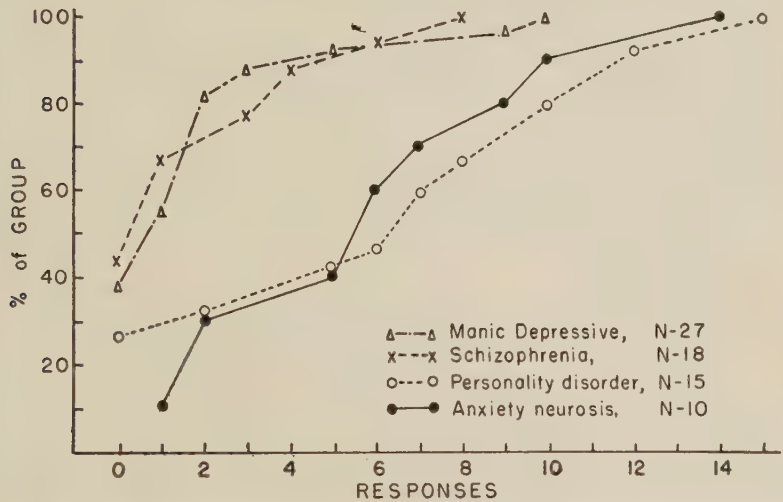


FIG. 4.—Cumulative response curves of response to shock in the extinction period.

Results

The material of this experiment is made up of the numbers of four different types of responses, namely, the orienting response, the anticipatory response during the conditioning period, the anticipatory response during the extinction period, and the response to shock during the extinction period.

The nature of the raw data can be seen in the cumulative response curves shown in Figs. 1, 2, 3, and 4. These were constructed by plotting the percentage of subjects in each group who gave x responses or less as ordinate against number of responses as abscissa. In this way, the range of number of responses in a group is given by the abscissa range on the group's curve, and the median number of responses for a group is approximately the value where the 50% ordinate line cuts the curve.

In order to determine if there were significant differences between the groups as to the number of responses made in any of the four classes, the groups were

paired, and then each group was divided into two using the overall median number of responses for the two groups as the dividing line. From the four subgroups formed in this way a 2×2 table was obtained, and the variables were then subjected to Chi squared analysis. An example of this procedure is given in Table II.

TABLE II

Chi squared analysis of the difference in number of orienting responses between the anxiety neurosis group and the schizophrenic

Anxiety N.:		Schizophrenia	
No. of responses	No. of subjects		
7 or more	2	13	Chi squared = 7.05: $p < .01$
8 or more	8	5	

The significant differences calculated by this method are tabulated in Table III. The directions of these differences can be inferred from the curves in Figs. 1, 2, 3, and 4. The other differences were calculated and none proved to be statistically significant.

TABLE III

Significant differences between groups as to the various types of response

Orienting response:	Anxiety N. vs. Schizophrenia - $p < .01$
	Anxiety N. vs. Manic-depressive - $p < .05$
Anticipatory response in conditioning period:	Anxiety N. vs. Schizophrenia - $p < .1$
	Personality D. vs. Schizophrenia - $p < .01$
	Personality D. vs. Manic-depressive - $p < .05$
Anticipatory response in extinction period:	Personality D. vs. Schizophrenia - $p < .02$
Response to shock in extinction period:	Anxiety N. vs. Schizophrenia - $p < .1$
	Anxiety N. vs. Manic-depressive - $p < .02$
	Personality D. vs. Schizophrenia - $p < .1$
	Personality D. vs. Manic-depressive - $p < .1$

The correlations of the orienting response with the other types of response within each group were calculated, using the rank correlation method. The correlations of the two anticipatory responses were also calculated. The results of these analyses are shown in Table IV.

TABLE IV

Rank order correlations of one type of response with another in each group

	Anxiety N.	Personality D.	Schizophrenia	Manic-depressive
Orienting response— anticipatory response in conditioning period	Rho = .16	.6	.49	.41
Orienting response— anticipatory response in extinction period	.56	.83	.64	.58
Orienting response— response to shock in extinction period	.87	.79	.52	.65
Anticipatory response in conditioning period— anticipatory response in extinction period	.53	.39	.64	.71

Discussion

From our data it appears that subjects with personality disorder (as defined above) condition more rapidly than either schizophrenic or manic-depressive subjects, and that subjects with anxiety neurosis tend to condition more rapidly than those with schizophrenia. These findings disagree with those of Taylor and Spence (18) quoted above, but cannot be compared with those of any other investigation.

Our data also show that subjects with anxiety neurosis or personality disorder tend to have a greater resistance to extinction of certain conditioned responses than subjects of either of the two psychotic groups. These findings agree with those of Howe (6) as to the relative performance of subjects with anxiety neurosis and of those with schizophrenia. But while this statement is true of the conditioned "response to shock" in our experiment, it is not true of the conditioned "response anticipating shock".

An important finding in this study was that the anxiety neurotics took significantly longer to become habituated to the conditioned stimulus than either of the psychotic groups. While a number of the subjects became habituated to the conditioned stimulus in the first few trials, it can be seen from Fig. 1 that the majority of the subjects required four or more trials before being habituated. We assume that this fact was due to our choice of frequency (500 c.p.s.) and of loudness (65 decibels) for the conditioned stimulus. Other investigators have used either softer tones, e.g. Howe (6) who used a tone of 40 decibels intensity, or like Franks (4) have eliminated from the experiment subjects who gave more than a certain number of unconditioned responses to the conditioned stimulus. Reese *et al.* (13) comment that they abandoned the use of auditory conditioned stimuli in their experiments because the orienting response proved to be difficult to extinguish.

Bitterman and Holtzman's paper (3) shows some difference in adaptation of the orienting response between the high and low anxiety groups, but they do not comment on this and it is not possible to determine from the data they present whether the difference is statistically significant. However, they do present an analysis of the adaption to the unconditioned stimulus in the two groups, and show that there was no significant difference in rate of adaptation between the groups. Our results show a significant difference in adaptation rate between subjects with anxiety neurosis and psychotic subjects to auditory stimuli.

Since the subjects with anxiety neurosis tended to be slower in extinguishing conditioned responses to shock than those with schizophrenia and manic-depressive disease, and condition more quickly than the former, the question arises as to how resistance to adaptation, rate of conditioning and resistance to extinction are related in general. In another paper (22) we have presented data showing that there was a high degree of correlation between the number of orienting responses made by a subject and the number of conditioned responses made in the extinction period. These data were based on the experiments done on part of the present sample of subjects, and they yielded a rank order correlation co-efficient (ρ) of .65. Values of ρ of the same order have been obtained for the particular groups of subjects discussed here (Table 4), when orienting response scores were correlated with anticipatory responses and responses to shock occurring in the extinction period. This work, therefore, suggests that the rate of adaption to the conditioned stimulus can be used to predict the subject's subsequent resistance to extinction of the conditioned response, at least in this particular type of experimental situation.

It seems possible, though Bitterman and Holtzman (3) present evidence against this, that the greater resistance to extinction of the subjects with anxiety neurosis is a function of increased sensitivity to pain, in this case the shock of the unconditioned stimulus. If the strength of the unconditioned stimulus were relatively greater for this group than for the others, superior conditioning in the sense of greater resistance to extinction might take place. There does not appear to be any definite evidence on this point, though the work of Passey (11), Spence (15) and Spence *et al.* (16) indicates that rates of acquisition of conditioned responses, and size of conditioned responses, are correlated with the strength of the unconditioned stimulus.

If this idea of varying sensitivity is applied more generally to include other modes of sensation, it could also be used to explain the differences between subjects in rates of adaptation to tones, air puffs, etc. We may then speculate that the finding of a correlation between adaptation rates and rates of extinction of conditioned responses reflects the fact that both are a function of some central state of reactivity. Such an idea was expressed by Thorndike (19), when he said, "I venture, though somewhat timorously, the prophecy that the phenomena of the pure conditioned reflex will teach us more about excitability than about learning." We believe that the present work is suggestive evidence that Thorndike's prophecy was correct.

SUMMARY

1. A review of the literature on classical conditioning in psychiatric patients was presented.
2. An experiment was described in which 70 psychiatric patients were conditioned to respond with GSR to a tone, the unconditioned stimulus being a shock. The patients comprised 27 with manic-depressive disease, depressed phase, 18 with schizophrenia, 15 with personality disorders, and 10 with anxiety neurosis.
3. The subjects with anxiety neurosis took significantly more trials to become habituated to the conditioned stimulus before the conditioning trials began, than the subjects of either of the psychotic groups.
4. The subjects with personality disorders conditioned significantly more quickly than subjects in either of the psychotic groups. The subjects with anxiety neurosis conditioned more quickly than those with schizophrenia, only between the .1 and .05 level of confidence.
5. The subjects with anxiety neurosis and with personality disorder tended to make more conditioned responses during extinction trials than subjects in either of the psychotic groups.
6. A high degree of correlation was found in each group of subjects between the rate of habituation to the conditioned stimulus and the rate of extinction of the conditioned response.
7. The implications of these findings were discussed.

ACKNOWLEDGMENTS

We should like to record our gratitude to the many physicians of Renard, Barnes and Bliss Hospitals, who allowed us to test their patients for this study.

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A CLINICAL TRIAL OF DESERPIDINE AND RESERPINE IN THE TREATMENT OF THE CHRONIC SCHIZOPHRENIC

By

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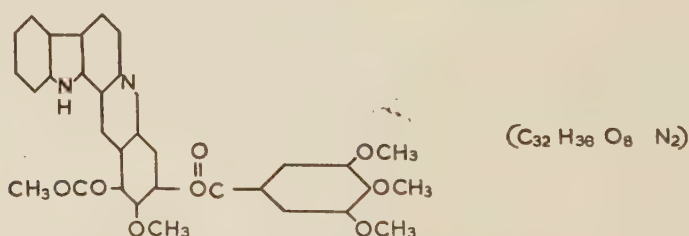
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RECENT work, such as that of Moore and Martin (1957), has shown that reserpine is of value in the treatment of the chronic schizophrenic patient. Attention has however been drawn to the incidence of side-effects in this form of treatment. These side-effects have limited the application of the drug and have also led to the search for a related substance, of similar clinical effect but without the troublesome toxic effects. This present trial is of a substance, deserpidine (Harmonyl, Abbott Laboratories), which it was thought would fulfil these requirements. The isolation of this alkaloid was first reported in 1955 by Stoll and Hofman, and it has subsequently been identified as 11-desmethoxy-reserpine (Harrison, 1955) which can be represented thus:



In trials of new drugs, the importance of employing controls has been pointed out by Foulds (1958). Since it has been claimed that deserpidine has less side-effects than reserpine, a comparison was made with the latter drug in addition to inert control.

It was felt that the best plan of the experiment would be that of a repeated double-blind, in which the two matched groups of patients were first treated with deserpidine and inert control tablets and then with reserpine and inert control tablets. The following outline will perhaps make the plan clearer.

TABLE I
Group I (30 Patients) Group II (30 Patients)

Period 1 (6 weeks)	Inert controls	Deserpidine
Period 2 (6 weeks)	Deserpidine	Inert controls
Period 3 (6 weeks)	Inert controls	Reserpine
Period 4 (6 weeks)	Reserpine	Inert controls

In this way it was hoped that the difficulties of obtaining identical groups would be to some extent offset. Further it was felt it would allow valid comparisons between the drugs, in particular, in clinical effect, and incidence of side-effects.

The method of assessment of clinical effect was by means of the Parkside Behaviour Rating Scale, in addition to a simple four-point scale (much improvement, moderate improvement, slight improvement and no change), based on the clinical impression of the authors, taking into account the observations of the senior nursing staff.

The Parkside Behaviour Rating Scale has been described by K. E. Schmidt (1957) and a validating study of the scale was carried out at the time. It was hoped that by the use of two such methods of assessment an estimate of the degree of correlation between them might be made thus supplying further validation of the P.B.R.S.

METHOD

Sixty male chronic schizophrenics of an aggressive disturbed type were selected, twelve patients from each of five wards, the average age being forty-six and the average length of illness seventeen years. They had either received no previous treatment or had reacted unsatisfactorily. It will therefore be appreciated that the prognosis of the group as a whole was poor. The twelve patients in each ward were divided at random into two sub-groups (I and II).

In Period 1 the patients in Group II were given deserpidine 1 mg. t.d.s. (3 mg. daily) for one week, whilst those in Group I were given inert tablets of identical appearance. Dosages then given were 2 mg. t.d.s. (6 mg. daily) for two weeks and finally 3 mg. t.d.s. (9 mg. daily), the inert tablets being given similarly. At the end of the sixth week the drug was withdrawn in Group II and after one week was replaced by inert tablets on the same dosage plan as in Period 1. The reverse procedure was carried out with Group I and thus it will be seen that Periods 1 and 2 constitute a double-blind trial of deserpidine as tested against an inert control.

After completion of Period 2 (in six weeks) all treatment was omitted for one week.

The second part of the trial (Periods 3 and 4) was a trial of reserpine using a double-blind technique against an inert control. The dosage of the active drug was 1 mg. t.d.s. for one week, 2 mg. t.d.s. for two weeks and then 3 mg. t.d.s. except where reduction of dosage or withdrawal was indicated on clinical grounds. As will be seen from Table I the active and inert tablets were switched between Groups I and II as in Periods 1 and 2.

RESULTS

The results obtained from the assessments on the four-point scale are shown in Table II, these assessments being made at the end of each period.

TABLE II

			Group I			
			Period 1 (Inactive)	Period 2 (D)	Period 3 (Inactive)	Period 4 (R)
Much improved	..	..	0	0	0	0
Moderately improved	..	..	0	0	0	0
Slightly improved	..	..	2	3	2	1
No change	..	..	28	27	28	29

Group II

			Period 1 (D)	Period 2 (Inactive)	Period 3 (R)	Period 4 (Inactive)
Much improved	..	..	0	0	0	0
Moderately improved	..	..	2	1	2	1
Slightly improved	..	..	4	2	4	0
No change	..	..	24	27	24	29

The assessments on the P.B.R.S. can be represented by the totals and averages of the thirty patients in each group, they were made before and on the completion of each period of treatment and the scores are set out in Table III.

TABLE III

Group I

		Period 1 (Inactive)		Period 2 (Active D)		Period 3 (Inactive)		Period 4 (Active R)	
		Pre	Post	Pre	Post	Pre	Post	Pre	Post
Average	..	15.77	15.53	15.53	15.53	15.53	15.53	15.53	15.53
Totals	..	473	466	466	466	466	466	466	466

Group II

		Period 1 (Active D)		Period 2 (Inactive)		Period 3 (Active R)		Period 4 (Inactive)	
		Pre	Post	Pre	Post	Pre	Post	Pre	Post
Average	..	14.23	14.63	14.60	14.40	14.40	14.66	14.60	14.36
Totals	..	427	439	438	432	432	440	438	431

The incidence of side-effects is shown in Table IV.

TABLE IV

Group I

			Period 1 (Inactive)	Period 2 (Active D)	Period 3 (Inactive)	Period 4 (Active R)
Hypotension:						
Over 20 points	..	..	0	5	3	4
10-20 points	..	..	0	3	2	1
Restlessness:						
Severe	..	..	0	0	0	2
Moderate	..	..	2	5	3	6
Slight	..	..	0	1	1	1
Drowsiness	..	..	1	3	1	2
Dizziness	..	..	0	1	0	0
Syncopal attack	..	..	0	0	0	2
Parkinsonism:						
Moderate	..	..	0	0	0	2
Slight	..	..	0	0	0	1
Puffiness of face	..	..	0	0	0	2
Erythema	..	..	0	0	0	1

Group II

			Period 1 (Active D)	Period 2 (Inactive)	Period 3 (Active R)	Period 4 (Inactive)
Hypotension:						
Over 20 points	..		5	0	6	1
10-20 points	..		6	0	7	0
Restlessness:						
Severe ..	..		2	0	3	1
Moderate ..	..		2	0	5	1
Slight ..	..		1	0	5	1
Drowsiness	..	..	3	0	7	0
Parkinsonism:						
Severe ..	..	..	0	0	1	0
Moderate ..	..	..	0	0	1	0
Slight ..	..	..	1	0	1	0
Puffiness of face ..	..	..	1	0	0	0
Shivering ..	..	..	5	0	0	0
Bradycardia	..	..	1	0	3	0

During Period 2 two patients had to be reduced to 1 mg. t.d.s. of active deserpidine. During Period 3 one patient had to have the dosage of reserpine reduced from 3 mg. t.d.s. to 2 mg. t.d.s., one from 3 mg. t.d.s. to 1.5 mg. t.d.s. and, in one case, the drug had to be withdrawn. In Period 4 two patients had their reserpine reduced to 1 mg. t.d.s. and in three cases it was withdrawn.

The effects of deserpidine and reserpine on the blood pressure and pulse were carefully observed by frequent readings. The B.P. estimations were made twice daily for seven days then daily for seven days and alternate days thereafter in each six-week period. Pulse rates were noted twice daily.

The side-effects in other systems were noted as they occurred.

The clinical results of the administration of deserpidine were disappointing, both as tabulated and on our general clinical impression. This opinion was almost unanimously held by the senior nurses also.

It was felt therefore that better results might be obtained if larger doses of deserpidine were given. Unfortunately however it was not possible to run a complete repeated double-blind trial on a second batch of patients, but it was considered worth while to take a group of twenty-one chronic schizophrenic male patients of a similar type to that in the original trial and to give them doses of deserpidine from 2 mg. t.d.s. increasing by 1 mg. t.d.s. per week up to 6 mg. t.d.s. (18 mg. daily) for a total period of three months. The same four-point scale of clinical assessment and the P.B.R.S. was used and the incidence of toxic effects was noted. Since there was no adequate control material the value of the assessment of the clinical efficacy was necessarily less, but this extension of the trial was thought to be justified.

The results of this part of the experiment are given in Table V.

TABLE V

- A 13 given up to 6 mg. t.d.s. (18 mg. daily) of which 6 were reduced to 4 mg. t.d.s. (12 mg. daily) and 1 reduced to 3 mg. t.d.s. (9 mg. daily).

Clinical Assessments					P.B.R.S. Ratings (totals)	
Much improved	..	..	..	0	Pre 175	Post 177
Moderately improved	..	..	..	0		
Slightly improved	..	..	..	3		
No change	..	..	..	10		
					(average)	
Incidence of Side-Effects					13.46	13.61
Drowsiness	..	..	..	9		
Restlessness	..	..	..	7		
Parkinsonism	..	..	..	2		
Nausea	..	..	..	1		

- B 3 given up to 5 mg. t.d.s. (15 mg. daily) of which 1 was reduced to 4 mg. t.d.s. (12 mg. daily) and 2 to 3 mg. t.d.s. (9 mg. daily).

Clinical Assessments					P.B.R.S. Ratings	
					(totals)	
Much improved	..	..	..	0	Pre 67	Post 65
Moderately improved	..	..	..	0		
Slightly improved	..	..	..	0		
No change	..	..	..	3		
Incidence of Side-Effects					(average)	
Parkinsonism	..	..	..	3	22.33	21.66
Drowsiness	..	..	..	3		
Shivering	..	..	..	1		

- C. 4 given up to 4 mg. t.d.s. (12 mg. daily) of which 3 were reduced to 3 mg. t.d.s. (9 mg. daily) and 1 was reduced to 2 mg. t.d.s. (6 mg. daily).

Clinical Assessments					P.B.R.S. Ratings (totals)	
Much improved	..	..	..	0	Pre 58	Post 58
Moderately improved	..	..	..	0		
Slightly improved	..	..	..	0		
No change	..	..	..	4		
					(average)	
Incidence of Side-Effects					14.5	14.5
Drowsiness	..	..	..	3		
Restlessness	..	..	..	4		
Hypotension	..	..	..	3		
Tension	..	..	..	4		

- D 1 was given 3 mg. t.d.s. (9 mg. daily).

Clinical Assessment				P.B.R.S. Ratings	
No change	..	..	1	Pre 16	Post 16
Side-Effect:				—	
Restlessness and tension					

DISCUSSION

The overall results of the trial show an agreement between the two scales to the effect that there is little clinical improvement in these chronic schizophrenic patients when treated with either deserpidine or reserpine. Too few positive results were obtained for any definite statistically valid conclusions to be drawn as to the degree of correlation between the P.B.R.S. and the 4-point

scale of clinical assessment. There is no statistically significant difference in the response to either active drug or inert control.

In regard to the incidence of side-effects there is generally a rather lower incidence with deserpidine than with reserpine although the difference is not significant statistically ($P=0.3$). In particular Parkinsonism occurred in only one patient receiving deserpidine and then of only very mild type. The difference in incidence of this one symptom is probably significant ($P=0.1$). There was in general less restlessness with deserpidine. Erythema and syncopal attacks, which occurred with reserpine, were notably absent with deserpidine. The hypotensive effect of the two drugs appeared to be similar. Dizziness and shivering occurred in a small number of the deserpidine group. Bradycardia of any degree of persistence was not marked with either drug.

The group of patients receiving the higher doses of deserpidine tended to show a generally disappointing response to treatment both as measured on the four-point scale and also the P.B.R.S. It might be noted once more that too few positive results were obtained for conclusions to be drawn on the correlation between these two scales on a statistically valid basis. It would appear that up to 18 mg. of deserpidine daily may be given without undue incidence of side-effects. However, the incidence of side-effects did rise, as indeed might be expected, although not apparently in a degree proportionate to the dosages given, except for Parkinsonism.

The periods of six weeks duration may be regarded as rather short but clinical impressions were that no further improvement was likely to be obtained by prolonging them, and indeed the results of the larger dosages given for three months were little if at all better.

CONCLUSIONS

The present trial suggests that, in the treatment of the chronic male schizophrenic of poor prognosis, neither deserpidine nor reserpine is of very marked clinical efficacy. This is contrary to the findings of some workers such as Ferguson (1957) and Malamud *et al.* (1957), although confirming the work of Freedman (1958) on a very different diagnostic group. Clinically this trial tends to suggest that deserpidine gives rise to less side-effects than reserpine, but the tabulated findings do not confirm this statistically. Further controlled trials on reserpine in particular appear to be indicated on the basis of the findings in this experiment.

The P.B.R.S. proved itself satisfactory in use although the graphic representation of changes in scoring could not be used owing to the small clinical changes found. In this particular experiment however it did not show in our opinion any definite advantage over the four-point scale, except of course facilitating comparison in similar trials.

SUMMARY

A trial is described to compare the clinical efficacy and side-effects of deserpidine (Harmonyl, Abbott Laboratories) with reserpine using also inert control tablets. A repeated double-blind technique was used on sixty chronic male schizophrenics, of an aggressive disturbed type, divided into two groups. The experimental period was sub-divided into four six-week periods with a week between each. The first two sub-divisions constitute a double-blind trial of deserpidine against inert controls, and the second two, a double-blind trial of reserpine against inert controls. The maximum dosage for both drugs was 3 mg. t.d.s. (9 mg daily). The incidence of side-effects was noted. Clinical assessment was both on a four-point scale and on the Parkside Behaviour Rating Scale.

The clinical efficacy of deserpidine in the first two periods appeared low and an additional group of twenty-one chronic male schizophrenics of a similar type were selected to test

increasing dosages of deserpidine up to 18 mg. per day for a period of three months to determine whether the dosage had been too low in the main trial. No marked increase in clinical efficacy was noted in the group receiving the larger doses.

The results are discussed and it is concluded that deserpidine and reserpine have little effect in the treatment of this type of patient, and the authors suggest the need for further controlled studies. It is not confirmed statistically that deserpidine gives rise to a lower incidence of side-effects than reserpine.

The use of the P.B.R.S., although showing little advantage over the four-point scale, would facilitate comparison trials it is concluded.

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O.R.T. PERFORMANCE IN SCHIZOPHRENIA

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INTRODUCTION

PHILLIPSON's Object Relations Technique (Phillipson, 1955) is roughly described as possessing features to be found in the T.A.T. and Rorschach methods. It consists of 13 cards, including a blank card. The design of the test and the order of card presentation are depicted in Table I.

TABLE I

					1	2	3	G
A	..	..	..	..	1	2	8	5
B	..	..	..	..	6	9	4	10
C	..	..	..	..	12	11	3	7

Thus there are cards with 1, 2, 3 or a group of persons depicted. Set A is drawn in very light, diffuse shading; Set B in clear blacks and whites; and Set C introduces colour.

As with the T.A.T., the subject makes up a story, but the greater ambiguity of the drawings together with their more systematized construction, renders them an attractive projective technique with advantages over the T.A.T. In addition (but not essential), the test has been designed with sympathies towards the object relations theory of Klein and Fairbairn.

Phillipson (*op. cit.*) has published the common responses given by a mixed group of 50 out-patients (neurotics and psychopaths) and O'Kelly (1957) has contrasted the responses of normal and delinquent adolescent girls.

The main objective of the present study was O.R.T. performance in schizophrenia, no studies at present having been reported of the technique with psychotics.

METHOD AND RESULTS

Test performances were obtained from 30 male schizophrenics, who were essentially a continuous sample of admissions to hospital. The varying items of response were tabulated as closely as possible to facilitate comparison with the out-patient sample. Generally speaking, as would be expected, the type and incidence of response were closely similar and will not be listed here. After the responses were obtained, an inquiry is conducted into the responses with the patient to elaborate and fill out exactly what is seen and meant. This is frequently unfruitful with mental hospital patients unless guided by clear questions. The present study particularly asked each patient to choose these cards which they (a) liked or found pleasing; (b) disliked and found unpleasant; (c) could identify with as reflecting some personal experience and fellow feeling.

Statistically significant differences (using chi-squared with appropriate corrections) between the groups are detailed in Table II. But as with all projective material it is important to emphasize points thought to be of clinical

interest but difficult to bring out statistically. Such points may also be of interest to other workers using the technique and will be made in the discussion.

TABLE II

	Schizophrenics	Out-Patients	χ^2
A2 Two main figures seen as female	12	8	4.5*
C1 Colour not mentioned	3	16	3.4*
C3 Colour incongruous or difficult	7	2	5.1*
C1 No figures seen	10	0	6.1*
C2 Less than 2 figures seen ..	15	7	10.6†
B3 Less than 3 figures seen ..	7	1	7.3†

* $S > 0.05$; † $S > 0.01$.

In addition, it had been noted at interview that 13 of the 30 schizophrenics clearly indicated they had had no established contact at all with members of the opposite sex. To card A3, 6 schizophrenics responded with direct sexual themes (such as prostitutes soliciting) and 5 of these 6 were in the 13 sexually isolated group. This relationship is significant ($\chi^2 = 4.3^*$).

Throughout the test, there are clearly far fewer "introduced" characters, that is, characters, not actually seen in the cards but brought into the stories. In fact, only 5 of the 30 schizophrenics made 8 introductions.

It cannot be assumed that the above differences are due to diagnostic differences alone. Accordingly, the O.R.T. responses were examined of 20 neurotic and psychopathic in-patients, of mixed sex, tested by the writer. None of the above differences remain significant using this in-patient group in place of the out-patient group. Two further differences were obtained at a statistical level of confidence as shown in Table III.

TABLE III

	Schizophrenics	Neurotics	χ^2
A2 Conventional love themes ..	3	8	4.7*
Set C Identification	9	0	5.1*

Finally, it must be mentioned there were no marked differences with regard to reaction time, total time, productivity (number of words) and speed.

DISCUSSION

It is interesting that differences obtained between the schizophrenic and out-patient groups were not significant between the schizophrenic and neurotic in-patient groups. There are several explanations for this.

First, different interviewers may produce somewhat different types of test response. Second, possibly both the in-patient samples were less intelligent than the out-patient group, the latter being generally of greater than average intelligence. But 14 of the 30 schizophrenics were definitely of above average ability. In fact, only one of the items in question showed any relationship to intelligence within the schizophrenic group. This, the perception of 2 female figures on A2, is related to higher matrices grading ($\chi^2 5.9^*$). Thus, if intelligence had been a differentiating feature between the groups, this item would have been more common, rather than less common in the out-patient group. The schizophrenics were of a similar age range to the out-patient group (15-39) but probably of a lower average age. In any event, age variations showed no internal effects.

A third source of variance, and perhaps the most important one, is that of hospitalization. This probably indicates a more severe or incapacitating illness, whether of psychotic or neurotic type. There are also the effects of hospitalization itself, the loss of role in the community together with a sense of stigma. If this is the case, the fewer "introduced" characters, the fewer perceived figures, the negative reactions to colour fall into a meaningful pattern. They parallel the greater difficulties in human relationships, feelings of isolation and emotional inhibition of the mental hospital patient, whatever the cause. Perhaps the greater incidence in the perception of female figures reflects either a correlated loss of sexual role or a need for a nurturing figure. Why this feature is related to greater intelligence is difficult to say. It may possibly be related to a greater insight into illness and its effects.

Turning to the differences obtained between the schizophrenic and neurotic in-patient groups, the first is that between sex and love themes for A2. As previously noted, the crudely sexual type of theme in the schizophrenic is related to an absence of contact with the opposite sex. The implication is that the schizophrenic is not capable of socially acceptable responses in heterosexual relationships. Sexual oddities are frequent in schizophrenia—abnormal sexual interest, abnormal lack of interest, homosexuality and other deviations. The neurotic at least presents a more socially acceptable façade, whatever his difficulties.

The other important difference was the greater identification by the schizophrenics with the coloured Set C. But, as shown in Table IV, this is misleading as there is also greater identification with sets B and C.

TABLE IV

		Liked		Disliked		Identification	
		Neurotics	Schizophrenics	Neurotics	Schizophrenics	Neurotics	Schizophrenics
A	..	4	7	12	30	4	8
B	..	5	14	10	13	5	8
C	..	4	12	6	10	0	9
1	..	2	9	6	9	1	4
2	..	2	7	6	13	2	4
3	..	3	10	3	12	3	7
G	..	6	7	13	19	3	10

Perhaps the generally greater tendency to identify with the cards, on the part of the schizophrenic is due to the basic breakdown of the boundaries of the ego or self, recently well described by Freeman *et al.* (1958). Yet it is also apparent from Table IV (but not at a statistical level of confidence) that the schizophrenics also choose more liked and disliked cards. If this is of any relevance, it seems to imply that the schizophrenics are more able to express personal views on the cards than the neurotics. The schizophrenic condition may produce less inhibition in these matters and the neurotics more inhibition. In this respect, it is interesting to note that none of the neurotics identify with Set C. The rationale of this set, with its introduction of colour, is of a particular stimulation of difficulties in the adult world of reality.

From Table IV, it seems that both schizophrenics and neurotics, but particularly the schizophrenics, dislike Set A, more than Sets B and C. According to Phillipson's test rationale, the relative absence of reality content, other than the human figures in a very vague setting, stimulates primitive dependency

needs and consequent anxieties. The patients typically say the cards are "gloomy, nothing clear or definite", "misty", "difficult to make out".

If the cards are considered in terms of whether they show 1, 2, 3 or more people, both groups tend to dislike the group cards more frequently. This probably fits in with the noted tendency to reduce the numbers of dramatic personae.

Although the schizophrenic group were fairly representative of the condition obviously "psychotic" responses were few. In fact, only two patients gave this type of response. In both cases this seemed to be due to the stimulus card setting off a personal phantasy or memory not clearly separated from the card and therefore possessing an almost hallucinatory quality. For example, to card A1 (a vague figure in even vaguer surroundings), the following was interpolated into the response ". . . And there seems to be some traffic about . . . I think there's a policeman about—and he is in uniform. He's not there definitely but he came afterwards—he just came into it somehow—I just had the notion of it".

Two schizophrenics gave responses of a very innocuous nature, but on inquiry afterwards, one picked out a large number of cards he disliked, saying they all really suggested themes of rape to him. The other patient similarly thought a large number really suggested violence and murder. Both these patients expressed marked ideas of reference during interview. It would appear that some schizophrenics may be partially able to inhibit unacceptable material. Such a feature of course, is not limited to O.R.T. material but it does suggest that an O.R.T. performance and inquiry may be useful in eliciting it.

A fairly common observation with the schizophrenic group was of an absence of interplay between the perceived figures. They seem to be isolated. There is also a suggestion of uncertainty and peculiarity in the perception of the figures. Both phenomena are difficult to measure quantitatively but are of considerable importance in the analysis of an individual record. In general, the writer believes the O.R.T. may be useful in the individual assessment of schizophrenia and as such is a welcome instrument. Despite adverse criticism, the Rorschach test has been the only tool as yet which the majority of clinical psychologists have found to be of practical use in the individual assessment of psychotic conditions.

SUMMARY

This study has been mainly concerned with O.R.T. performance in 30 male schizophrenics but has also contrasted in-patient and out-patient groups. As no O.R.T. work on psychosis has previously been reported, both clinical comments and a statistical analysis have been reported in the hope that further studies will be stimulated.

ACKNOWLEDGMENTS

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THE TREATMENT OF DEPRESSIVE STATES WITH IMIPRAMINE HYDROCHLORIDE (TOFRANIL)

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DRUG treatment of depressive states has hitherto been somewhat disappointing but recent reports by Kuhn (1957, 1958), Kielholz and Battegay (1958) from Switzerland, and Azimo and Vispo (1958) from Canada have claimed that imipramine hydrochloride (Tofranil) has "thymoleptic" qualities and is of specific therapeutic value in states of endogenous depression and allied affective disorders.

Tofranil (Geigy Laboratories) is chemically N-(gamma-dimethylamino-propyl)-iminodibenzylhydrochloride. It is an iminodibenzyl derivative but has a structural resemblance to promazine. It possesses spasmolytic, atropine-like qualities, possibly some ganglion-blocking activity, but has only a very slight analgesic and sedative effect.

In the present trial the drug was first investigated on twenty patients, 10 male and 10 female. All fell into the broad group of endogenous depressions—involuntional melancholia (5 cases), endogenous depression (13 cases) and senile depression (2 cases).

The ages of the patients ranged from 50 to 83 years, with an average of 63 years, 1 month. The average duration of illness was 4 years, 5 months.

Eighteen patients had previously received electroplexy. One of these had shown no response, while 17 had relapsed after more than one course of treatment. The remaining two patients had not received electroplexy on physical grounds.

The experiment was conducted on a controlled basis using the "double-blind" technique, the patients being divided equally into two groups at random. For the first two weeks one group received Tofranil and the other group received identical placebo tablets. The converse of this arrangement was used for the second two weeks. The hospital pharmacist alone knew the identity of the respective tablets.

In this initial trial all patients received 50 mg. b.d. of Tofranil, or placebo, on the first day, increasing by 50 mg. daily to a maximum of 250 mg. on the fifth day.

Clinical and nursing assessment was carried out independently during and at the end of each fortnightly period.

Table I indicates the comparative response of patient to Tofranil and placebo tablets at the end of the first month.

TABLE I
Initial Pilot Trial

							Tofranil	Placebo
Not improved	..	..	..	..	..	..	2	18
Improved	..	..	..	..	..	..	11	2
Much improved	..	..	..	..	..	..	7	0
Total	..	..	..	..	..	..	20	20

Improved—(improvement in mood and habits, increased spontaneity and interest).

Much improved—(good clinical response showing relief of depression whilst still on tablets).

The results of this pilot trial on long-term hospitalized patients were sufficiently encouraging to justify furthering our experience with Tofranil by extending its use to more recent admissions and out-patients with depressive states and trying it also on a small group with other disorders.

To date, 109 patients have received Tofranil, of whom 8 failed to continue taking the drug. Of the remaining 101 patients, 74 were suffering from depressive states (see Table II). Eight cases of schizophrenia were included in the investigation. Five of these had depressive symptoms; the other three were cases of catatonic schizophrenia who required maintenance electroplexy. The latter were included to test the hypothesis that Tofranil might act as replacement therapy for E.C.T. The remaining nineteen patients, all of whom were out-patients, were suffering from chronic anxiety states with hypochondriasis and depression. The follow-up period till now covers eight months.

Patients were assessed after three months of treatment, and the results are shown below:

TABLE II

Diagnosis	Not Improved	Improved	Much Improved	Recovered	Total
Endogenous depression	3	14	22	14	53
Involuntional melancholia	0	3	4	2	9
Senile depression	0	1	2	3	6
Puerperal depression	1	1	1	1	4
Serpasil induced depression	0	1	0	1	2
Schizophrenia	5	3	0	0	8
Anxiety neurosis	12	7	0	0	19
	21	30	29	21	101

Recovered, indicating complete clinical and social recovery, drug discontinued for at least 4 weeks.

If these figures are confined to depressive states 28 per cent. of patients made a complete recovery and only 4 failed to show any degree of improvement.

The following illustrative cases describe the type of patients whom it was thought advisable to treat with Tofranil.

Case 1

Chronic depression, physical contra-indication to E.C.T.

L.S., aged 83, had been hospitalized for 10 years, suffering from a senile depressive illness. She had remained retarded, resistive and mute, requiring total care. Chronic bronchitis and hypertension with auricular fibrillation precluded E.C.T. Her condition improved considerably on Tofranil, 50 mg. t.i.d. for 2 weeks and she remains on a small maintenance dose of 25 mg. t.d.s. She is bright, cheerful, mixes freely, and employs herself usefully in the ward, but relapses as soon as the drug is withdrawn.

Case 2

Recurrent endogenous depressions resistive to E.C.T.

J.D., aged 67, had received 6 courses of electroplexy for recurrent depressive episodes since 1951, with good response on each occasion. Lately, however, the periods of recovery following E.C.T. were becoming shorter and relapses more frequent. In July, 1958, he was again morbidly depressed and retarded, with hypochondriacal ideas and delusions of guilt and poverty. He was given 150 mg. Tofranil daily in divided doses and was symptom-free within 2 weeks. A fortnight after his discharge from hospital, he was seen at the out-patient clinic. He was then hypomanic. Dosage was reduced to 50 mg. b.i.d., and a week later there was no evidence of any affective anomaly. Tofranil was eventually discontinued. He remained well for some 2 months before he once more became depressed. He again responded to the drug, and is now maintained on 50 mg. b.d.

Case 3

Recurrent endogenous depression, treatment in the early stages of relapse.

A.H.W., aged 78, presented at the out-patient department with morning depression, terminal insomnia, and some psychomotor retardation. She had a history of 4 previous depressive episodes, all of which required hospitalization and electroplexy. On this occasion she was unwilling to be admitted, and also refused out-patient E.C.T. She made a full recovery after 2 weeks on Tofranil, 50 mg., twice daily. She has remained well on a maintenance dose of 25 mg. b.i.d.

Case 4

Severe depression precipitated by Serpasil in a patient with malignant hypertension.

W.B., aged 56, had a history of severe hypertension with 2 periods of hypertensive encephalopathy. When seen in consultation, he was in a state of severe depression, with ideas of reference, and had nihilistic and hypochondriacal delusions. There was no evidence of clouding of consciousness. His hypertension had been treated for 6 months with Serpasil and, although this was discontinued immediately, his mental state 6 weeks later remained unchanged. Tofranil brought about a complete remission of his depression within 10 days. The dosage was gradually reduced and finally discontinued. He remains well.

SIDE-EFFECTS

During the pilot trial, all cases had daily pulse and blood pressure readings and weekly blood and urine examinations. Fortnightly examinations have continued since the investigation was extended. While larger doses of the drug were given, nearly all patients complained of mild, atropine-like side-effects, such as sweating and dryness of the mouth. Dilatation of the pupils was very common, but only 2 patients had difficulty in accommodation. Constipation and occasional difficulty in initiating micturition were mentioned. Two patients complained of slight dizziness, and three elderly patients with benign hypertension showed some ataxia, associated with slight fall in blood pressure. None of the above side-effects were, however, of such severity to necessitate discontinuing the drug. No allergic skin reactions have been seen, nor was there any evidence of Parkinsonism. Epileptiform seizures occurred in 4 patients and the dosage had to be reduced. Blood counts revealed in some cases a transient eosinophilia, but in one case only was there evidence of blood dyscrasia. This was a man of 60 who, after 4 months on Tofranil, developed a stomatitis associated with a leucopenia (white cell count 2,800 per c.c.). The blood count returned to normal when the drug was discontinued. In 6 cases a noticeable swing into hypomanic elation took place after the first week of treatment, but this subsided within a fortnight, following the withdrawal of the drug. In 2 of these cases smaller maintenance doses of Tofranil (50 mg. daily) were again instituted, without any untoward effects.

DISCUSSION

Our results confirm the encouraging reports by Kuhn and others. Tofranil proved an effective, although as yet somewhat unpredictable, drug in states of endogenous depressions with retardation, endogenous depressions of late age,

and involuntional depressions, provided the patients were retarded and not agitated. There was no satisfactory response in reactive depressions or psychoneurotic patients with a secondary depressive overlay. Chronic anxiety states with hypochondriasis failed to show any marked improvement. Of the small group of schizophrenic patients, only 3 catatonic schizophrenics seemed to have shown some response; whereas previously they required weekly, or fortnightly, maintenance E.C.T., the need for maintenance treatment was considerably reduced whilst they were put on Tofranil. However, this group of patients is too small for any definite conclusion.

The delay in obtaining a therapeutic response, and the need for maintaining the patient on the drug for a long time, made us feel justified at present in using Tofranil as a substitute for E.C.T. There are, however, many patients who suffer from depression who either failed to respond to repeated courses of E.C.T., or where even modified electroplexy involves a certain risk. There are also patients in a milder state of endogenous depression in whom E.C.T. may not be as yet indicated, or who refuse this form of treatment. In these kind of cases Tofranil seemed to be of definite value.

The side-effects are mild and so far no serious toxic effects, apart from one case of leucopenia, have been seen in our series. It is of great importance to examine patients frequently and exercise some caution, as the dosage may have to be individually adjusted because of a hypomanic swing or epileptiform seizure in patients who have been on the drug for a long time.

Tofranil can easily be misused in general practice and prove to be harmful until more experience is gained. It may delay the use of electroplexy, it may change a retarded depression into hypomania, and it will prove of little value in neurotic hypochondriasis and reactive depressions. The further trial of this promising drug should at this stage be primarily concerned with the chronic depressive patients of whom many remain institutionalized at present.

SUMMARY

Tofranil was tried on 101 patients. The results were encouraging, particularly in states of retarded endogenous depressions. Although this drug is not a substitute for E.C.T., it has a definite place in the treatment of depressed patients who fail to respond to electroplexy or who are physically unfit to have E.C.T. Further trials should be undertaken to assess its further indications. The drug proved to have few side-effects and comparatively low toxicity.

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Reviews

ESP and Personality Patterns. BY GERTRUDE RAFFEL SCHMEIDLER AND R. A. MCCONNELL. New Haven, Yale University Press, 1958. Pp. 136. 25s.

Dr. Schmeidler has, for a number of years, been studying extrasensory perception (chiefly in card-guessing of Rhine's form) and in studying how any apparent ability correlates with the subject's temperament and with his emotional attitude to the topic. In this book she presents her results, together with statistical comments and analyses by R. A. McConnell.

The work has clearly been performed with skill and care. The conclusions are stated with moderation and with a deep appreciation of the possible errors that threaten to make the deductions invalid.

The book can be recommended to those who want to keep in touch with the best modern developments in the subject.

W. ROSS ASHBY.

The Measurement of Values. BY L. L. THURSTONE. University of Chicago Press, Chicago, 1959. Pp. 322.

The book is a collection of twenty-seven of Thurstone's major contributions to psychology, collected into a volume, with explanatory insertions.

The title states the theme. Those who are interested in the measurement of the more complex aspects of behaviour will find here much material that is no longer in print, collected so as to give a just exposition of the author's views and method.

W. ROSS ASHBY.

Symposia on Child and Juvenile Delinquency. Presented at the American Orthopsychiatric Association—BENJAMIN KARPMAN, Editor. Psychodynamics Monograph Series, Washington D.C., 1959. Pp. 364. \$10.00.

This is a complete report with added analyses and comment of five symposia on juvenile delinquency, held under the auspices of the American Orthopsychiatric Association between 1949 and 1953, previously published in part in the *Journal of Orthopsychiatry*. In the first three symposia an attempt was made to delimit the problem of psychopathy in children as clinically different from other behavioural antisocial disorders. In the last two symposia, child delinquency in general was considered and particularly aetiology and symptomatology. Treatment was only touched on; a subject considered to require another symposium. The participants were eminent American Child Psychiatrists, who represented somewhat different points of view, under the chairmanship of Dr. Benjamin Karpman. This full account of their deliberations is instructive, in that it allows the reader to appreciate the disparate nature of the contributions and then the gradual emergence of a broad approach to and, at the same time, a more co-ordinated assessment of the problems involved. On the other hand, there is the disadvantage of much repetition, perhaps necessary in discussion, which is apt to be wearisome to the reader. There are, however, excellent summaries by the Chairman at the end of each section. It seems unnecessary in a serious work to include some black and white illustrations of dramatic incidents that occurred in the case histories of patients discussed.

Primary psychopathy in children was considered a relatively rare condition and, when present, to be diagnosed with difficulty. Most conditions that commonly passed for psychopathic had undoubted psychogenic elements that marked the reaction as being basically neurotic. The personality of the true psychopathic child was regarded as specific, with a lack of positive relationship capacity, an absence or shallowness of fantasy life, limited capacity to experience anxiety and lack of super-ego awareness. The psychopathic child was considered to be clearly demarked from the neurotic delinquent or from the brain-injured child. There

was, however, less agreement on the aetiology, with a bias towards regarding an inadequate opportunity in the first years for the establishment of a meaningful mother relationship as the most important factor. There was little attempt to try and link up this concept of primary psychopathy in children with that of psychopathic personality in adults; the need to do so, however, by long term studies, was stressed.

The last two symposia on delinquency in children recognized the complexity of the problem and although the main concern was with the psychiatric aspects, the close relationship between psychodynamic, social and cultural factors was emphasized. No single approach could be expected either to explain causation or to treat its symptoms.

W. WARREN.

Speech and the Development of Mental Processes in the Child. BY A. R. LURIA AND F. IA YUDOVICK. Staples Press, London, 1959. Pp. 126. 15s.

This book was first published in 1956 in U.S.S.R. by the Academy of Educational Sciences. In his foreword, Professor Zangwill points out that Professor Luria, a psychologist, has made important contributions to the study of aphasia and regards the study of language and its development as the key to our understanding of vital problems in human intellectual growth.

The authors review Soviet writings on speech and particularly the work of Vigotsky, who considered that human development has its source in the verbal communication between child and adult, that "a function which is earlier divided between two people becomes later the means of organization of the child's own behaviour". Methods are then discussed by which the participation of speech in the formation of mental processes can be studied, including firstly investigations of the child's mental development, which concentrate on variations in the construction of activity in the course of development of speech; secondly, analysis of cases in which brain injury has led to the disintegration of speech; or thirdly, a special experimental method, which involves either the inclusion of speech in the fulfilment of various tasks or its exclusion from their fulfilment. This third experimental method can be used in cases of retarded speech development in the child, where an artificially hastened acquisition of speech may lead not only to enrichment of speech activity, but also to a substantial reorganization of the child's whole mental development. Such an investigation is believed to eliminate the factors of gradual maturation or some brain abnormality. In a child, the environment may not have involved an urgent necessity for the development of speech communication. By changing this, a rapid development of the child's speech may ensue and the effect of this on the structure of mental processes can then be investigated.

A pair of identical twins, aged five years, with well-marked retardation of speech, but without mental backwardness, proved to be suitable subjects for investigation. Partly because of their unstimulating home background and also being closely linked to each other, they had not been faced with an objective necessity for transition to speech communication as much as in other children. It happened, however, that they spent their days in a 'day nursery' where they could be investigated and treated. Their speech, vocabulary and general behaviour were assessed; they were then separated for three months and placed with groups of normal children, while one twin was also given planned training which was continued when they were allowed to rejoin each other. Both twins, and particularly the latter, considerably improved both in speech and in general mental progress and these steps forward were also analysed.

This account of a clinical experiment is of considerable interest and, according to Professor Zangwill, it should stimulate fresh enquiries into the development of speech disorders in children. It is, however, a single experiment, which would seem to require to be repeated with statistical controls, to test the authors' conclusions.

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THE JOURNAL OF MENTAL SCIENCE

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SUPPLEMENT

JANUARY, 1959

THE ROYAL MEDICO-PSYCHOLOGICAL ASSOCIATION

WINTER QUARTERLY MEETING

THE WINTER QUARTERLY MEETING of the Association was held on 13 February, 1958, at 11 Chandos Street, Cavendish Square, London, W.1, under the Presidency of Dr. R. W. Armstrong.

MINUTES

The Minutes of the Autumn Quarterly Meeting, held on 14 November, 1957, to be published in a forthcoming Supplement to the *Journal of Mental Science*, were taken as read, and confirmed and signed by the President.

OBITUARY

The President announced with regret the death of:

HARVEY BAIRD, M.D., late Medical Superintendent, Periteau House, Winchelsea; an Ordinary Member since 1908.

A. HELEN A. BOYLE, M.D.Brux., L.R.C.P.&S.E., L.R.F.P.S., Founder and late Physician to the Lady Chichester Hospital. President 1939-40; an Ordinary Member 1898; Honorary Member 1949.

GEORGE HARRY AMYRALD CHAMBERLAIN, M.D., M.R.C.P.I., D.P.M. Consultant Psychiatrist, Graylingwell Hospital, Chichester; an Ordinary Member since 1955.

R. FINLEY GAYLE, Jr., M.D., Professor and Chairman of the Department of Psychiatry and Neurology, Medical College of Virginia, U.S.A.; a Corresponding Member since 1956.

ALLEN COULTER HANCOCK, M.C., M.B., B.S., D.P.H., D.P.M., late Medical Superintendent, Kent County Mental Hospital, Maidstone; an Ordinary Member since 1920.

ERNEST JONES, M.D., F.R.C.P., D.P.H., Honorary President of the International Psycho-Analytical Association, Institute of Psycho-Analysis and British Psycho-Analytical Society; an Honorary Member since 1951.

MYRA MACKENZIE, M.B., Ch.B.Aberd., late Medical Superintendent, The Lawn, Lincoln; an Ordinary Member since 1930.

RONALD S. PATON, M.A., M.B., Ch.B., Medical Superintendent, C.L.D., Perth: Medical Officer, Perth Prison; an Ordinary Member since 1954.

JOHN SHEALE PRATT, B.A., M.B., B.Ch.Cantab. 36 Spring Street, London, W.2; an Ordinary Member since 1947.

HAROLD GEORGE BEDFORD RUSSELL, M.A.Camb., M.B., B.Ch.Camb., F.R.C.S., Surgeon-in-Charge, Throat Department, St. Bartholomew's Hospital, London; an Honorary Member since 1942.

ELECTION OF ORDINARY MEMBERS

The following were unanimously elected to Ordinary Membership:

BLACK, ALAN ARNOLD, M.B., B.S., Registrar, Bethlem Royal and Maudsley Hospitals.

Proposed by Drs. F. K. Taylor, A. Lewis and D. L. Davies.

CORSELLIS, JOHN ARTHUR NICHOLAS, M.R.C.S., L.R.C.P., Neuropathologist, Runwell Hospital, Wickford, Essex.

Proposed by Drs. R. Ström-Olsen, H. Weil-Malherbe and A. Meyer.

COULSTING, HUGH STUART, M.B., Ch.B., D.P.M., Medical Director, Cheltenham, Gloucester and County Child Guidance Clinic.

Proposed by Drs. J. J. Graham, D. T. Maclay and A. Walk.

DANIEL, PETER MAXWELL, M.A., D.M., M.R.C.P., Professor of Neuropathology, University of London, Institute of Psychiatry.

Proposed by Drs. D. L. Davies, H. Weil-Malherbe and R. Ström-Olsen.

DAVIES, STEPHEN LEWIS, B.Sc., M.B., B.Ch., Registrar in Psychiatry, Middlewood Hospital, Sheffield.

Proposed by Drs. F. T. Thorpe, A. Kelly and A. R. Garner.

DUNCAN, DAVID, M.B., Ch.B., Junior Registrar, The Retreat, York.

Proposed by Drs. R. W. Bryson, D. Joyce Galbraith and R. H. Parker.

ELLIS, DERICK DAVISON, M.B., B.Ch., D.P.M., Psychiatrist, Winwick Hospital, Warrington.

Proposed by Drs. H. Fleming, G. J. Harrison and J. E. Howie.

FRIEZE, MARSHALL, L.R.C.P., L.R.C.S., L.R.F.P.S.G., Registrar, Psychiatric Unit, St. James's Hospital, Leeds.

Proposed by Drs. D. Fenton Russell, H. B. Kidd and S. R. Shaw.

GALEA, ABRAHAM, M.D., B.Pharm. (Royal University of Malta), Assistant Resident Medical Officer, Hospital for Mental Diseases, Malta.

Proposed by Drs. V. Vassallo, J. Pullicino and I. C. Lodge Patch.

GREEN, BETTY FLORENCE, M.B., B.S., Junior Medical Officer, Fountain Hospital.

Proposed by Drs. K. M. Fraser, A. Harris and J. S. Bearcroft.

HOLDEN, JOSEPH CECIL, M.R.C.S., L.R.C.P., D.P.M., Senior Registrar, Winwick Hospital, Warrington.

Proposed by Drs. G. J. Harrison, L. Couper and H. Fleming.

IVES, GEORGE ANTHONY, M.B., Ch.B., Senior House Officer, Bethlem Royal and Maudsley Hospitals.

Proposed by Drs. J. S. Bearcroft, L. Harris and F. A. Whitlock.

KRAWIECKI, JURAND ALEKSANDER, M.B., Ch.B., D.P.M., Deputy Medical Superintendent, Springfield Hospital, Crumpsall, Manchester.

Proposed by Drs. R. A. Blair, N. J. de V. Mathers and Susanne Shafar.

LISTER, JEREMY, M.R.C.S., L.R.C.P., D.C.H., Senior Medical Officer, Cefn Coed Hospital, Swansea.

Proposed by Drs. S. C. Macmillan, D. E. Jones and Rosemary Dearden.

LITTLEJOHN, JOHN, L.R.C.P.&S.(Edin.), Senior Medical Officer, Hartwood Mental Hospital, Shotts, Lanarkshire.

Proposed by Drs. W. N. J. Chapman, J. Milne and A. Walk.

MADDEN, JOHN SPENCER, M.B., B.Ch., B.A.O., D.P.M., Senior Registrar, Rainhill Hospital, Nr. Liverpool.

Proposed by Drs. G. C. Heller, D. P. A. L. Scott and H. A. Cooper.

MEZEY, ALEXANDER GOLDFEDER, M.Sc., M.D., M.R.C.P.Ed., D.P.M., Senior Registrar, Maudsley Hospital.

Proposed by Drs. I. A. Cameron, D. J. West and J. S. Stead.

MICHELL, EDWARD PHILIP GUY, M.B., B.Ch., M.R.C.P., D.C.H., Senior Registrar, Children's Department, The Tavistock Clinic.

Proposed by Drs. D. Hunter, D. Gough and J. D. Sutherland.

O'SHEA, MARY ELIZABETH, M.B., B.Ch., B.A.O., Psychiatric Registrar, Whipps Cross and Langthorne Hospitals.

Proposed by Drs. J. E. M. Glancy, T. P. Riordan and G. Somerville.

POWER, PATRICK JAMES, M.B., B.Ch., B.A.O., D.P.M., Medical Superintendent, Ennis Mental Hospital, Co. Clare, Eire.

Proposed by Drs. J. R. Shea, J. Fitzgerald and H. J. Eustace.

RAMSAY, THOMAS ANDERSON, B.Sc., M.B., Ch.B., F.R.F.P.S.G., Assistant Administrative Medical Officer to the Northern Ireland Hospitals Authority.

Proposed by Drs. C. B. Robinson, Dorothy Gardner and J. B. Nabney.

SAFADI, FORTUNATO, M.D., Senior Lecturer on Psychiatry, University of Guayaquil, Ecuador (at present at the National Hospital, Queen Square).

Proposed by Drs. K. M. Fraser, L. A. Hersov and A. Walk.

SARSFIELD, MARY BRIDGET, M.B., B.Ch., B.A.O., D.P.M., Assistant Medical Officer, Mental Hospital, Ballinasloe, Galway, Eire.

Proposed by Drs. J. R. Shea, J. Fitzgerald and H. J. Eustace.

SPEAR, FRANK GRAHAM, M.B., Ch.B., Medical Officer, R.A.F. Neuropsychiatric Centre, Halton.

Proposed by Drs. J. L. Swift, J. S. Hughes and R. M. Bowman.

STROH, GEORGE, M.B., B.S., D.P.M., Senior Registrar, Hertfordshire Child Guidance Service.

Proposed by Drs. S. H. Foulkes, L. A. Hersov and W. J. Stauble.

Candidatures approved by Council, 13 November, 1957:

BRADY, JOHN PAUL, B.A.(Boston), M.D.(Boston), Resident in Psychiatry, Institute of Living, Hartford, Conn., U.S.A.

Proposed by Drs. J. D. Sullivan, A. Walk and A. B. Monro.

FURR, JOHN HAPPER, B.A., M.D.(Virginia), Resident in Psychiatry, Institute of Living, Hartford, Conn., U.S.A.

Proposed by Drs. J. D. Sullivan, A. Walk and A. B. Monro.

MOTLEY, JOHN PAUL, B.S.(Grangetown), M.D., Resident, Institute of Living, Hartford, Conn., U.S.A.

Proposed by Drs. J. D. Sullivan, Mary Sullivan and A. B. Monro.

REPORT OF COUNCIL

The Report of the Council, as follows, was read by the GENERAL SECRETARY:

"The General Secretary reported that the Memorandum drawn up by the Committee on Evidence to the Royal Commission on Doctors' and Dentists' Remuneration had been sent to the Secretary of the Royal Commission with a suggestion that oral evidence might be given by Drs. Armstrong and Harris. The Memorandum had been acknowledged.

The Editor-in-Chief reported that the Journal Committee had decided to use tougher paper wrappers for the *Journal*. Volume III of *Recent Progress in*

Psychiatry would be published within the next three months: Volume IV was to be discussed at the May Meeting.

The Registrar reported that another successful two-day Lecture Course had been held and that over 400 applications for tickets had been received. Council congratulated the Registrar on the success of this Lecture Course.

The Librarian reported that more books had been issued recently than during the corresponding period of last year, but the increase did not appear to be in proportion to the number of new members. The increased postal charges had not affected the Library budget to any great extent.

It had been suggested, and agreed, that lists of recent acquisitions should be circulated to members from time to time.

The Secretary of the Education Committee reported that the Committee had decided not to set up a sub-committee on post-graduate education, because the ground had already been covered by the material collected for the memorandum entitled, 'Review of the Mental Health Aspects of the National Health Service'.

It was felt, however, that mental hospitals could provide much more teaching for junior doctors than they were now providing, and a sub-committee would be set up with representatives of the various interested bodies, to correlate the viewpoints of university centres, teaching hospitals and the Association, on the present-day requirements of post-graduate students of psychiatry. It was recommended that the Papers and Discussions Committee be asked to consider the possibility of arranging papers on 'The Role of the Mental Hospital in the Post-graduate Teaching of Psychiatry' at a Quarterly or Annual Meeting.

The Fellowship in Psychiatry Sub-committee had recommended the creation of an Honorary Fellowship of the Association, but the Education Committee had decided to refer further discussion of this topic to Council with a strong recommendation against creating a Fellowship. After some discussion Council agreed that this question should not be considered further at this time.

The Secretary of the Films Sub-Committee reported that a very successful film show was held on 17 February. The Sub-Committee proposed to re-circularize all R.M.P.A. members of the Film Viewing Panel and to stimulate more general interest in the work of the Panel. Dr. W. S. Maclay had presented three films to the Association and it was proposed to give these to the British Film Institution for retention in the National Archives.

Dr. Gould had corresponded with Dr. Forbes of the Medical Defence Union on the subject of possible legal risks in the making and showing of medical films. Council agreed that the Association's solicitors should be consulted.

It was reported that the Disciplinary Committee had considered the case of a nurse convicted of petty theft who had been struck off the Register of the General Nursing Council. After due consideration of the circumstances the Committee had decided to reconsider her case in one year's time. Council endorsed the action of the Disciplinary Committee.

The Secretary of the Parliamentary Committee reported that the Committee had again considered the position with regard to Merit Awards.

After discussion Council agreed that arrangements should be made for a question to be asked in the House as to the total number of consultants in psychiatry in this country, and the number in receipt of Merit Awards of various grades.

The summary of Parliamentary proceedings had been circulated to members of Council. The outstanding events of the period reviewed were the debates on the services for the Chronic Sick and Elderly; on Rampton Hospital; and on the introduction of a private member's Bill to amend the law on divorce for incurable insanity and on the effect of insanity on desertion in accordance with the recommendations of the Royal Commission on Marriage and Divorce.

The Secretary of the Papers and Discussions Committee reported that the Papers Session at the May Meeting would be on the theme of 'Community Care and Mental Illness'.

The programme of the Scottish Study Tour had been sent to all members of the Association and arrangements for the Tour were now complete.

The President expressed the pleasure of Council at having Dr. Cook among them again. Dr. Linford Rees was thanked by the President and Dr. Cook for acting as Secretary of the Committee during Dr. Cook's illness, and it was stated that he would continue to help Dr. Cook until the end of the session.

Council agreed that the Papers and Discussions Committee should take over the organization of Seminars at the Spring and Annual Meetings.

The Secretary of the Public Relations Committee reported that he had had an interview with the Public Relations Officer of the British Medical Association who had advised him to notify the medical correspondents of certain newspapers that a Public Relations Committee had been set up by the R.M.P.A. He had also suggested that liaison should be established between the Public Relations Committees of the B.M.A. and the R.M.P.A.

A letter had been received from a layman regarding the policy of the Association in respect of mental hospitals, and it was proposed to send him a reply setting out the general policy of the Association on this question.

The General Secretary stated that a letter had recently been received from the British Medical Association suggesting certain minor amendments to the Report of the Committee to Review the Mental Health Services Aspects of the National Health Service. Further minor amendments were suggested by members of Council.

It was decided that the Research and Clinical Section Executive Committee should be asked to produce a brief statement on the question of research for the next meeting of Council and that this should be followed at a later date by a more detailed report. The whole Report, when complete, to be sent to the Ministry of Health.

Council, feeling that more co-operation between psychiatrists and Medical Officers of Health was desirable, agreed that the Society of Medical Officers of Health should be contacted with a view to holding discussions on the possibility of co-operation at local level.

The General Secretary read a letter from the Ministry of Health concerning the formation of a Working Party to consider the provisions made for convalescent treatment in the four metropolitan regions. Council agreed to appoint an *ad hoc* committee.

A letter from Dr. Desmond Pond was read concerning a proposed survey of the epileptics in mental hospitals in this country. Council agreed that this should be referred to the Research and Clinical Section Executive Committee.

The General Secretary referred to a communication from the World Federation for Mental Health concerning a 'Mental Health Year' to be held in 1960. It was agreed that the question of the part to be played by this Association should be discussed by Section Executive Committees at the May Meeting.

The President read a letter from the Ministry of Health concerning the appointment of an inter-departmental committee to review the advice given in 1926 by the Departmental Committee on Morphine and Heroin Addiction, and inviting the Association to nominate a member to serve on this Committee. Council reaffirmed the decision, made at the meeting on 13 November, 1957, to appoint Dr. M. Partridge."

PAPERS

The following Papers were read:

Morning Session: **"Addictive Personality"**

Dr. M. Partridge.

"Epidemiological Aspects of Alcoholism"

Dr. Denis Parr.

Film: **"To Your Health."**

Afternoon Session: **"The Treatment of Addiction with Particular Reference to Alcoholism"**

Dr. J. A. Hobson.

"Benzedrine Addiction and Allied Problems"

Dr. P. H. Connell.

SPRING QUARTERLY MEETING

THE SPRING QUARTERLY MEETING of the Association was held on 1 May, 1958, at Cheadle Royal, Cheadle, Cheshire, under the Presidency of Dr. R. W. Armstrong, by kind invitation of the Management Committee and of Dr. W. V. Wadsworth.

MINUTES

The Minutes of the Winter Quarterly Meeting, held on 13 February, 1958, to be published in a forthcoming Supplement to the *Journal of Mental Science*, were taken as read, and confirmed and signed by the President.

OBITUARY

The President announced with regret the death of:

JOHN BRANDER, M.D., F.R.C.P., D.P.M., late Medical Superintendent, Friern Hospital; an Ordinary Member since 1911.

ELECTION OF ORDINARY MEMBERS

The following were unanimously elected to Ordinary Membership:

BURROWS, WILLIAM GERALD, M.D., L.M.S., L.M.C.C., Department of National Health and Welfare, Canada; Hon. Consultant Psychiatrist, London Marriage Guidance Clinic.

Proposed by Drs. G. O. Cowdy, A. Walk and Thomas Tennent.

CANNICOTT, STANLEY McCORMICK, M.C., M.A., M.B., B.Ch., D.P.M., Senior Registrar, Holloway Sanatorium, Virginia Water, Surrey.

Proposed by Drs. J. A. Irwin, H. G. Bogle and R. Macdonald.

CONNELL, PHILIP HENRY, M.D., D.P.M., Consultant Psychiatrist, Newcastle General Hospital; Associate Physician, Department of Psychological Medicine, Royal Victoria Infirmary, Newcastle-upon-Tyne.

Proposed by Professor E. Stengel, Drs. W. Linford Rees and F. Post.

CULPAN, ROGER HECTOR, M.B., Ch.B.(N.Z.), M.R.C.P., M.R.A.C.P., Registrar, Maudsley Hospital.

Proposed by Drs. M. Shepherd, F. A. Whitlock and A. A. Black.

DE BASTARRECHEA, JAIME, M.B., Ch.B., D.P.M., Consultant Psychiatrist, Friern Hospital, and Visiting Consultant in Psychiatry to Archway Hospital Group.

Proposed by Drs. I. Sutton, Pauline Stirling and Beryl Margolis.

ELLISON, CARICE, M.B., B.S., D.R.C.O.G., Registrar, Bethlem Royal and Maudsley Hospitals.

Proposed by Drs. J. G. Hamilton, I. C. Lodge Patch and K. M. Fraser.

ERULKAR, JOSEPH, M.B., B.S., M.R.C.P., D.C.H., D.P.M., Registrar, Bethlem Royal and Maudsley Hospitals.

Proposed by Drs. J. G. Hamilton, K. M. Fraser and I. C. Lodge Patch.

FOORD, ROY DOUGLAS, M.B., B.S., Member of the Scientific Staff of the Medical Research Council, Gambia, West Africa.

Proposed by Drs. H. Pullar-Strecker, J. G. Hamilton and G. W. Smith.

McNAIR, GWENLLIAN ELIZABETH, M.B., B.Ch., B.Sc., Registrar, Rainhill Hospital, Nr. Liverpool.

Proposed by Drs. G. C. Heller, R. H. Martlew and I. R. Nussbaum.

McNAIR, JAMES STEPHEN, M.R.C.S., L.R.C.P., Junior Medical Officer, Rainhill Hospital, Nr. Liverpool.

Proposed by Drs. G. C. Heller, R. H. Martlew and I. R. Nussbaum.

MASON, PAMELA GEORGINA WALSH, M.B., B.S., D.P.M., Registrar, Maudsley Hospital, Denmark Hill, London, S.E.5.

Proposed by Drs. W. Warren, D. Leigh and B. Ackner.

PHILLIPS, BRIAN SELSEY, M.A., M.B., B.Chir., Senior House Officer, Severalls Hospital, Colchester.

Proposed by Drs. A. G. Duncan, R. Ström-Olsen and H. Jacobs.

RATHOD, NEHKANT HAMERMALL, M.B., B.S., D.P.M., Senior Registrar, Cane Hill Hospital, Coulsdon.

Proposed by Drs. J. T. Hutchinson, H. Dale Beckett and D. Smedberg.

ROWBOTHAM, MONICA DALYSON, M.B., Ch.B., D.P.M., Assistant Psychiatrist, Tiverlands Child Psychiatric Department, Newcastle-upon-Tyne.

Proposed by Professor M. Roth, Drs. R. Orton and G. F. Rowbotham.

Candidature approved by Council, 12 February, 1958:

KOLTES, JOHN ALBERT, B.S., M.D., Chief of Service, Department of Psychiatry, Jefferson Medical College Hospital, Philadelphia, Pennsylvania, U.S.A.

Proposed by Drs. T. P. Rees, Maxwell Jones and A. B. Monro.

ELECTION OF ASSOCIATE MEMBER

The following was unanimously elected to Associate Membership:

MACDONALD, JOHN EDWIN, M.A., Dip.Psych.; Associate British Psychological Society; Senior Psychologist, Graylingwell Hospital, Chichester, Sussex.

Proposed by Drs. D. Curran, J. Carse, and R. Ström-Olsen.

REPORT OF COUNCIL

The Report of the Council, as follows, was read by the GENERAL SECRETARY:

“Arising out of the minutes of the previous meeting the distribution of distinction awards as regards physicians, surgeons and psychiatrists, was considered at length. In view of the unsatisfactory position revealed by recent answers to questions in Parliament, it was decided that the Evidence Committee should prepare a supplementary memorandum of evidence for submission to the Royal Commission on Remuneration. It was also decided that appropriate letters should be sent in the name of the Association to the Ministry of Health, the Department of Health for Scotland, the Distinction Awards Committee, the President of the Royal College of Physicians, and the Joint Consultants Committee.

The reports of the Principal Officers and of the Standing Committees were received. Points of outstanding importance were:

The Treasurer reported that the finances of the Association were in a satisfactory state, largely due to the successful efforts of the Editor-in-Chief in reducing the cost of the *Journal*.

The Education Committee recommended that the material which had been collected on the subject of the selection of nursing tutors should be incorporated in a memorandum as a valuable source of information for those interested in nurse training. The Film Sub-committee reported a continuation of their activities.

The Parliamentary Committee recommended that a special committee should be appointed to prepare evidence for the working party set up by the Minister of Health to consider the structure of hospital medical staffing. It was decided to reappoint the Committee which had prepared evidence for the Royal Commission on Doctors' Remuneration, with the addition of Dr. Cook, as the two aspects were felt to be intimately related.

The Papers and Discussions Committee reported that the main speakers at the Annual Meeting would be Professor L. J. Meduna, who would discuss his early researches leading to the discovery of cardiazol, and Professor H. J. Eysenck, who would speak on 'Learning Theory and Deconditioning.'

The subject of the Papers Sessions at the November Quarterly Meeting would be 'Community Care Relating to Mental Disorder in Old Age', and it was hoped that this would be a joint meeting with the Society of Medical Officers of Health.

The Public Relations Committee reported only slight progress in making contact with representatives of the press, and recommended that a cocktail party to press representatives should be given by the Public Relations Committee at the Annual Meeting in July.

Dr. L. C. Cook reported on the Committee appointed to consider convalescent treatment in connection with the Ministry of Health Working Party. Although the Ministry's definition of convalescence was felt to be excessively narrow, Council recommended that the Committee should nevertheless prepare a report incorporating the Association's wider views for submission to the Ministry."

PAPERS

The following papers were read:

Morning Session: **"Social Class and the Treatment of Neurosis"**
Professor A. B. Hollingshead.

"The Chronic Psychotic Patient in the Community"
Dr. G. M. Carstairs.

Afternoon Session: **"Methods of Organizing Community Care of Mental Illness"**
Drs. A. Pool, Duncan Macmillan and J. Carse.

"Boarding Out, Rehabilitation and Resocialization of Mental Hospital Patients"

Mrs. Joan Williams (Psychiatric Social Worker, Central Hospital, Warwick).

NORTHERN AND MIDLAND DIVISION

THE SPRING MEETING of the Division was held at Monyhull Hall, King's Heath, Birmingham, on Wednesday, 2 April, 1958, by kind invitation of the Hospital Management Committee and the Medical Superintendent, Dr. R. J. Stanley.

Some members toured the Hospital in the morning and took special interest in the School for E.S.N. Children which is jointly administered by the Hospital and the Local Education Authority. Children come to this school from all over the country.

The Chairman of the Management Committee welcomed the Division at luncheon, and the Divisional Chairman, Dr. G. McCoull, thanked the hosts for their kind hospitality.

The following Candidates were elected to Membership:

DEW-JONES, JAMES ATHOLL, M.A., M.R.C.S., L.R.C.P., Registrar, The Towers Hospital, Humberstone, Leicester.

Proposed by Drs. T. Wishart Davidson, R. W. Lennon and C. E. H. Turner.

DUNN, JOHN FREDERICK, M.B., Ch.B., D.P.M., Assistant Psychiatrist (Senior Medical Officer), Lancaster Moor Hospital.

Proposed by Drs. A. A. Martin, S. Smith and H. C. Fisher.

TAYLOR, RONALD MOCHRIE, M.B., Ch.B., D.P.M., Senior Medical Officer, Highcroft Hospital, Birmingham.

Proposed by Drs. D. Anton-Stephens, E. Jacoby and R. W. Tibbetts.

The Report of the Divisional Management Committee and that of the Divisional Representatives on Council were given by the Hon. Secretary.

The following Officers were elected for 1958/59:

Chairman: Dr. T. M. Cuthbert.

Honorary Secretary: Dr. G. M. Woddis.

Assistant Honorary Secretary: Dr. W. V. Wadsworth.

Junior Representative on Council: Dr. B. Ward.

The following members were elected to the Divisional Committee of Management: Drs. J. F. Donovan, B. Finkleman, E. U. H. Pentreath and C. E. Turner.

Clinical Session

Dr. L. J. Segal, Consultant Psychiatrist at Monyhull Hall, read a paper entitled:

"A Preliminary Report of the Distribution of Somatotypes in the Populations of a Mental Deficiency Hospital"

SCOTTISH STUDY TOUR 1958

by EDWARD S. STERN, *Honorary Secretary*, and others

Twenty-five members, including officials of Health Ministries of four countries, twelve medical superintendents, and also five doctors' wives, visited Scottish psychiatric clinics. Those travelling from London left by sleeping car on the evening of 19 May, without mishap, except that British Railways had unfortunately berthed one of our ladies with a gentleman who was not a member! The rest of the party were joined at Dumfries, and from there the journey was made by motor coach.

Our first visit was to Crichton Royal, where Dr. Harper showed us the unrivalled Easterbrook House, with its swimming bath, hair salon, hall, gymnasium, ping-pong room, library, and canteen. The staff is equally lavish, with two full-time gymnasts, one pianist, and five nurses on recreational therapy alone. This is but a sample of the Crichton, with its great buildings, gardens, and complete equipment. It looks back to a long tradition. We were entertained to lunch and then visited Drumlanrig Castle, with its great collection of pictures, by invitation of the Duchess of Buccleuch, on our way to Ayr, which was reached that night.

Next morning we visited Ailsa Hospital, Glengall, which Dr. Brawn Miller is rapidly bringing to a leading position. He has trebled the admission rate in as many years, raised the proportion of voluntary patients, provided occupations,

opened wards, and established busy out-patient clinics and home visits. Cooking is done on the wards, which allows women to play the feminine rôle, as well as improving the meals. We were struck by the good standards of furnishing and carpets on the wards. Meanwhile, the ladies were taken on an exciting tour under the care of the Baillie. Again we were treated to an excellent lunch by the Board, before which we were plied lavishly with the "wine of the country" by Dr. Miller, and after which he took us on a visit to Culzean Castle on the sea cliffs, and entertained us all to tea.

The same evening we reached Glasgow and were received at the Southern General Hospital, where we met local psychiatrists and doctors on the hospital staff. Next morning our host, Professor Ferguson Rodger, explained his department and how he had planned it. We were struck by his thoughtful approach and the complete use he had made of its possibilities. The demonstration room has a one-way screen and amplifier, which seems to be a feature of Scottish psychiatric teaching. An exhibition of psychological tests, paper chromatography, nuclear sexing, and scientific publications, was mounted in the laboratory. Dr. Freeman gave an address on how he uses analytical knowledge in teaching elementary psychiatry. Dr. Sclare described his co-operation with the chest physician in the treatment of the asthmatic in a group with a number of his fellows, "so that he can get his difficulties off his chest" and enlarge his circle, for "he suffers from a diminution of his breathable world". Dr. Munro showed a case of Klinefelter's syndrome. The psychiatric department is up to date in every way, and well integrated with medical and other services. Surely, we thought, this must be the best in the world. It is impossible to describe it adequately in a short article.

Some of us went to see the well-housed, equipped and staffed Notre-Dame Child Guidance Clinic, where Sister Jude entertained us hospitably. A large party went to Woodilee, where Dr. Cramond and his team had got patients up, introduced the new treatments, and improved wards so that now the number of voluntary admissions is rising and the hospital is designated for teaching. Another party visited Lennox Castle, which has 1,400 mental deficiency beds, and is built in blocks—15 villas and 15 huts—on a steep slope. Dr. MacGillivray, the Medical Superintendent, has 140 patients under the Criminal Justice Act, and a school for backward boys.

The 23 May was spent in the long and beautiful drive from Glasgow to Inverness, where we were welcomed by Dr. Whittet with true Highland hospitality, and met the Chairman of the Regional Hospital Board and Board of Management. After enjoying the pipes, sword-dances, reels, and Highland fling, to say nothing of whisky and Loch Ness salmon, we were entertained to a Caelidh, at which we Sassenachs cut poor figures compared to the Northern Celts. Next morning, Dr. Whittet read a paper on "Psychiatry in the Highlands and Islands", and showed how the problems of distance have been faced in the psychiatric covering of one-third of Scotland from Craig Dunain Hospital. "Gay in song, Calvinist in religion, we're an interesting study for the summer months. Civilization has left us grace and favour here, in spite of its ravages elsewhere. Work and open doors don't cure all patients: for they had these things at home. Psychiatry has been oversold to the public; we lead them to think that we can cure more than we do. Our patients are not blinded by science—it's what they think you are that counts. 75 per cent of them are born psychiatrists—I'm the amateur." We were conducted round this well-situated, spacious hospital, with its fine ward furniture and carpets. After lunch we visited the non-statutory unit—Dunain House—which admits mainly alcoholics. Throughout our visit we were impressed by the high standard of feeding enjoyed by staff and patients as well as visitors.

At Aberdeen we were personally welcomed by Professor Millar, who introduced us to the University staff, and showed a keen interest in us and our wish to see Scottish Psychiatry. He has achieved an exceptional degree of happy co-operation between all psychiatric interests. In his own department we were given a talk by Dr. McKenzie of the U.S.A. He and the Professor favour the psycho-

analytical approach to the treatment of psychotics, and they successfully brought us into the discussion. Visits were also made to Kingseat Mental Hospital, where Dr. Stewart is forging ahead steadily and carrying his staff with him as he consolidates each advance. This hospital was the first in the British Isles to be laid out on the villa system—a plan similar to that now favoured by the World Health Organization.

A visit to the Aberdeen Child Guidance Centre under Miss Margaret Buchanan was of interest in showing a well-organized school psychological service and also a peculiar problem of Aberdeen children who may be subjected to considerable educational pressure at home owing to the strong local academic tradition. Beechwood School for the Physically and Mentally Handicapped, under Miss Mitchell, is of a standard of building and equipment that has to be seen to be believed, including remedial gymnasia for spastics and others, domestic training, cooking, laundry, carpentry, and shoemaking. A short visit was also paid to Woodlands Home for in-patient care of lower grade children, run by Dr. Moore Taylor, with its young staff and general air of neatness.

Next day we drove to Murray Royal, Perth, where we met Dr. McDougall, an old friend of the tourists, and Mr. Smart, the Chairman. After luncheon in a dining room with large windows looking over the Cairngorms, we toured this contented hospital and visited Gilgal, the neurosis unit which admits mostly alcoholic voluntary patients. Dr. Stalker read us a paper on psychosomatic physiology.

Next morning was spent in Professor Kennedy's luxurious psychiatric department at Edinburgh University, and he gave us a full account of his achievements and thoroughgoing plans for teaching, research, co-ordination, and direction. Dr. Laverty read a paper on drug trials. Dr. T. A. Munro and the Board of the Royal Edinburgh Hospital for Mental and Nervous Disorders kindly entertained us to lunch, after which some toured the hospital, with its fine accommodation for private and "amenity" patients at Craig House. Others were welcomed by Dr. Bailey at Gogarburn Institution, and were particularly struck by his wide experience, friendly treatment of patients, including rehabilitation in a ward they run themselves, and close link with the Neurosurgical Department of the Royal Infirmary. Others visited the Department of Psychological Medicine of the Royal Edinburgh Hospital for Sick Children, where Dr. Methven explained the organization of teaching and treatment, and her Senior Psychiatric Social Worker, Miss Macewen, described interesting cases. We also visited the residential unit, which though only housed in a hut, in its happy atmosphere and professional skill is, like the rest of the department, an example that we would wish to follow.

That night a most successful closing dinner was held in Edinburgh. The next morning, 29, was left free, and in the afternoon we visited Dr. G. M. Bell, the pioneer of open doors and thus of the modern liberal attitude to patients, at Dingleton. The atmosphere of this hospital is so strikingly happy, with its elimination of hostility, violence, and incontinence, without regimenting patients into groups or drilling them in habit training, that any doubters must have left Dingleton fully converted. On behalf of the town, Provost Laurie attended to express his appreciation of the new freedom given to the patients. The hospital is attractively decorated in pleasing colours, with matching bedspreads and curtains, and interesting furniture. Mrs. Bell hospitably entertained the ladies.

We paid a private visit to Abbotsford, and were charmingly and enthusiastically shown round by Mrs. Maxwell Scott. Dr. Bell and his Board then entertained us to dinner at Peebles Hydro., and after a visit to Melrose Abbey "by the pale moonlight", thus ending the tour on a high note, he saw us off to our several destinations by the night train.

Summarizing: The Scottish psychiatric scene is as different from the English as is the geographical. The administrative units—Regional Hospital Boards and Hospital Groups—are smaller and so there is a more intimate and probably more efficient government. But apart from this, all administration is medical, and it appeared

to be better informed, smoother in its working, and more economical, the medical superintendents being willing to make decisions and accept responsibility. In the mental hospitals the Matron is usually in charge of both male and female sides, to give better nursing co-ordination. The mental hospitals we visited were advancing, if occasionally with a little canny hesitation. But above all it was the University Psychiatric Departments which struck us as far in advance of anything we had seen elsewhere. They are well integrated with the mental and mental deficiency hospitals, child guidance clinics, etc. The medical superintendents and other medical directors hold appointments as lecturers in the University, which in turn makes ample use of their facilities and clinical material for teaching. The senior academic staffs were distinguished by having had practical experience in the mental hospital field, and so they are well respected by their colleagues. Instruction is given, not only to undergraduates and postgraduates, but also to medical auxiliaries, ministers of religion, etc. Research is active and the professorial units specialize in the investigation of rare cases and the carrying out of difficult biochemical, pathological, or psychological work.

Finally, the boundless hospitality, both private and public, that we enjoyed from our hosts, made the tour a happy and easy one. We thank them all heartily and especially Professor Ferguson Rodger for suggesting this tour and the General Board of Control for Scotland for planning it and personally meeting and helping us throughout.

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